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A review of the tuskfishes, genus Choerodon (Labridae, Perciformes), with descriptions of three new species

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Abstract

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The Indo-West Pacific labrid genus *Choerodon* comprises 27 species assigned here to six subgenera based on genetic and morphological evidence. Three of the subgenera are monotypic with distinctive morphological features, another two comprise species with a relatively deep body and generalised form and the remaining is a complex of small species referred to below as dwarf tuskfishes. Twenty-three species have valid scientific names, three are undescribed and one requires a replacement name because the name in use is a junior homonym. More than half of the species of *Choerodon* occur in northern Australian waters while only four are distributed in the western Indian Ocean, with two of the four currently undescribed. Among the undescribed species, *Choerodon cypselurus* sp. nov. is described from two individuals collected on the Saya de Malha Bank in the central part of the Indian Ocean and assigned to the subgenus *Aspiurocheilus* on the basis of body form and merstic values. *Choerodon skaiopygmaeus* sp. nov. is a dwarf species described from seven individuals collected off Somalia. The absence of life colour information for type specimens makes comparison with described species difficult, but the species is distinguished by pigmentation and morphometric evidence. The third new species, *Choerodon aurulentus* sp. nov., the largest of known dwarf tuskfishes, is described from two specimens collected on the northern Norfolk Ridge at the north-eastern extent of the Tasman Sea between New Caledonia and New Zealand. *Choerodonoides japonicus* Kamohara, 1958 is a junior homonym of *Labrus japonicus* Valenciennes, in Cuvier and Valenciennes, 1839, and is replaced by *Choerodon albofasciatus* nom. nov. Primary synonymies, synopses, known distributions and a dichotomous key to known species are provided.

Keywords

Xiphocheilus, sp. nov., taxonomy, Indian Ocean, western Pacific, Saya de Malha Bank

Introduction

The generic name *Choerodon* initially appeared in Bleeker (1847) as a *nomen nudum* for *Labrus macrodontus* Lacepède, 1802, a junior synonym of *Sparus anchorago* Bloch, 1790. Although a growing number of species were found to be referrable to what is a clearly definable labrid genus, early doubt as to the name's applicability to the group apparently existed because additional names were proposed, even by Bleeker (1858b). By the early 1900s *Choerodon* finally gained widespread acceptance for most species referred to the genus, although reference to species as *Choerops* Rüppell, 1852, persisted in publications until then (e.g. *Choerops rubescens* Günther, 1862, *Choerops Maeander* Cartier, 1874, *Choerops cephalotes* Castelnau, 1875, *Choerops perpulcher* De Vis, 1885, *Choerops albiqena* De Vis, 1885, *Choerops Hodgkinsonii* Saville-Kent, 1893, *Choerops nyctemblema* Jordan & Evermann, 1902, *Choerops palawanensis* Seale, 1910). Gomon (1997) provided a historical perspective, an overview of the assemblage then thought to number 25 species, and a hypothesis of the relationship of the genus with others in the tribe Hypsigenyini based on morphological examination of previously described taxa and collection materials available at that time.

Clements *et al.*'s (2004) genetic comparison of several members of the tribe with species long referred to a temperate Australasian family Odacidae provided evidence for paraphyly within the Hypsigenyini and a sister group relationship of the odacid species with at least one species referred to the genus *Choerodon*, its type species *Choerodon anchorago*. Westneat and Alfaro (2005) subsequently published an analysis of the families Labridae, Scaridae and Odacidae based on a larger data set corroborating the work of Clements *et al.* (2004) and the monophyly of the tribe Hypsigenyini – with the inclusion of the "Odacidae" – as the subfamily Hypsigenyinae. Westneat and Alfaro (2005) recovered a sister group relationship of the monotypic *Xiphocheilus* with the two species of *Choerodon*

included in their study as proposed by Gomon (1997), which in turn is sister to the "odacid" species, all with strong support. Puckridge *et al.* (2015) compared genetic sequences for what proved to be 20 species referrable to *Choerodon*, as defined by Gomon (1997), together with sequences of *Xiphocheilus typus*, four species of "odacids", five species of other hypsigenyin genera and two labrids. The study provided evidence for the monophyly of *Choerodon* with the inclusion of *X. typus* within one of four major clades. An independent analysis of sequences of many of the same species, as part of a larger data set for an ongoing investigation of the interrelationships of the Labridae by Westneat (personal communication), corroborates these findings. Morphology also supports these relationships and provides additional evidence for the subdivision of two of Puckeridge *et al.*'s clades, resulting in a cladistic tree comprising six clades.

This contribution presents a revised description of the genus *Choerodon*, primary synonymies, synopses and known distributions of described species referrable to the genus arranged in a taxonomic framework of six subgenera (most taking available names), descriptions of three new species, a new name for a previously described species (because its current name is a junior homonym) and a dichotomous key to the resultant 27 species. A list of proposed scientific names and their nomenclatural status for species referrable to the genus *Choerodon* is provided in Table 1.

Methods and Materials

General terminology and methodology follows Gomon (1997), except head depth is measured on the transverse plane at the posterior margin of the orbit and the interorbital width is the bony interorbital width. Caudal fin dorsal lobe length is the length of the longest ray in the dorsal lobe. Specimen lengths reported are standard lengths (SL), unless noted as total length (TL), and were measured to the nearest three significant digits; those less than 100 mm and given to two significant digits are as recorded in the respective museum registers and not remeasured. Head length when used as a proportional measurent may be abbreviated as HL. As relative measurements of body dimensions may vary ontogenetically, morphometric comparisons provided in taxonomic treatments are based on specimens larger than about 60 mm SL where possible. Specimens on which species treatments are based, apart from newly described species, are listed in the Appendix. In the lists of type specimens for new species treatments, the values enclosed by parentheses following registration numbers convey the size of the specimens in mm SL. Species distributions are based on material in museum collections, except where stated, to cut down on potential errors associated with misidentifications in the literature. Institution abbreviations follow Sabaj (2016).

For discussion purposes, Westneat and Alfaro's (2005) classification placing the tribe Hypsigenyini (Gomon, 2006) together with the family Odacidae (Gomon & Paxton, 1985, and others) in the subfamily Hypsigenyinae is adopted here, with genera and species previously placed in the family "Odacidae" referred to collectively as "odacids".

Species of *Choerodon*, like the vast majority of labrids, are protogynous hermaphrodites with individuals maturing first as females before transforming into males. All appear to have morphological differences between the two mature stages, if only in the form of colour pattern. Juveniles likewise frequently differ in colour pattern from mature adults. The three stages are referred to below as juvenile, initial phase and terminal phase.

A reanalysis of the interrelationships of *Choerodon* species based on mitochondrial (CO1 and 16S) and nuclear (RAG2 and Tmo4c4) genes was undertaken by Luisa Teasdale (personal communication) employing sequences featuring in the original study by Puckridge *et al.* (2015) with the addition of 14 CO1 sequences from recently acquired tissue, including those of the problematic species *Choerodon gymnogenys* not represented in the previous analysis, and 16S, RAG2 and Tmo4c4 sequences for a specimen of *Choerodon zosterophorus*, following the methodology described in that publication. Information about the sources and taxonomic identities of the previous sequences are available in the supplementary information accompanying Puckridge *et al.* (2015: Table S1), with details of the new sequences provided in Table 7. A species reported in Puckridge *et al.* (2015: 55, 56, figs 1 & 2) as *Choerodon cf margaritiferus* is re-identified below as *Choerodon albofasciatus* nom. nov. As only CO1 sequences were employed for 14 of the 15 additional species and only 16S, RAG2 and Tmo4c4 sequences for the remaining specimen in the latest analysis, their positions in the tree are indicative only of relative relationships. The same relative positions were recovered in maximum likelihood, maximum parsimony and neighbour joining trees. Consequently, scales for branch lengths and confidence values are not indicated in fig. 1.

Choerodon Bleeker, 1847

Figure 1; table 1

The generic synonymy is a sum of the subgeneric synonymies.

Description. Dorsal fin rays XII or XIII (rarely XI or XIV), 7 or 8 (rarely 6 or 9), total rays 20 (rarely 19); anal fin rays III, 9 or 10 (rarely 11); caudal fin rays 7–10 + 12 + 7–9 (rarely 6); pectoral fin rays ii, 13–17 (rarely 12); vertebrae 10 or 11 + 16 or 17 = 27; pleural ribs ending on 10th or 11th vertebra; epipleural ribs ending on 10th–14th vertebra; lateral line scales 27 (rarely 26) + 2; scales above lateral line 2½–5; scales below lateral line approximately 8½–11; predorsal scales approximately 4–15; total gill rakers 13–18.

Body moderately slender to deep; caudal peduncle moderately slender to very slender; head of moderate depth to very deep; snout usually rather short; head broadly pointed to bluntly rounded; dorsal outline of forehead and snout convexly curved to nearly straight in lateral aspect, nape convexly curved, strongly curved in some species; interorbital moderately broad; jaws not attenuate.

Dorsal and anal fins usually without obvious scaly basal sheaths, usually one much smaller scale or 1–3 progressively smaller scales at both ends of at least some oblique scale rows adjacent to fin bases, sheath when present rarely reaching well

Table 7. Species identification, tissue number, voucher number, GenBank accession numbers and collection localities for additonal sequences used in generating the tree in Figure 1.

Species			CO1	16S	RAG2	Tmo4c4	
Choerodon anchorago	NSMT-DNA14472	NSMT-P96180	LC164748				Japan, Ryu Kyu Is, Iriomote I
Choerodon anchorago	NSMT-DNA11214	NSMT-P76656	LC164746				Japan, Ryu Kyu Is, Ishigaki-jima
Choerodon gymnogenys	NMV Z33337	SAIAB 13307	KY626306				Mascarene Ridge, Indian Ocean
Choerodon gymnogenys	NMV Z33338	SAIAB 5621	KY626307				Mascarene Ridge, Indian Ocean
Choerodon gymnogenys	NMV Z33339	SAIAB 3621	KY626309				Mozambigue, Indian Ocean
Choerodon gymnogenys	NMV Z33340	SAIAB 13308	KY626302				Mascarene Ridge, Indian Ocean
Choerodon gymnogenys	NMV Z33341	SAIAB 13309	KY626303				Mascarene Ridge, Indian Ocean
Choerodon gymnogenys	NMV Z33342	SAIAB 13306	KY626305				Mascarene Ridge, Indian Ocean
Choerodon gymnogenys	NMV Z33344	SAIAB 2681	KY626308				Mascarene Ridge, Indian Ocean
Choerodon robustus	NSMT-DNA17255	NSMT-P66573	LC164744				Japan, Ryu Kyu Is, Okinawa-jima
Choerodon robustus	NSMT-DNA17256	NSMT-P66574	LC164745				Japan, Ryu Kyu Is, Okinawa-jima
Choerodon robustus	NMV Z33343	SAIAB 1852	KY626304				Mascarene Ridge, Indian Ocean
Choerodon schoenleinii	NSMT-DNA12218	NSMT-P79430	LC164747				Japan, Ryu Kyu Is, Okinawa-jima
Choerodon schoenleinii	NSMT-DNA60160	NSMT-P111319	LC164749				Japan, Ryu Kyu Is, Okinawa-jima
Choerodon zosterophorus	FMNH:ICHTHY:BUS03-35	FMNH:ICHTHY:BUS03-35:T501		KY815378	KY815589	KY815488	Philippines, Cebu

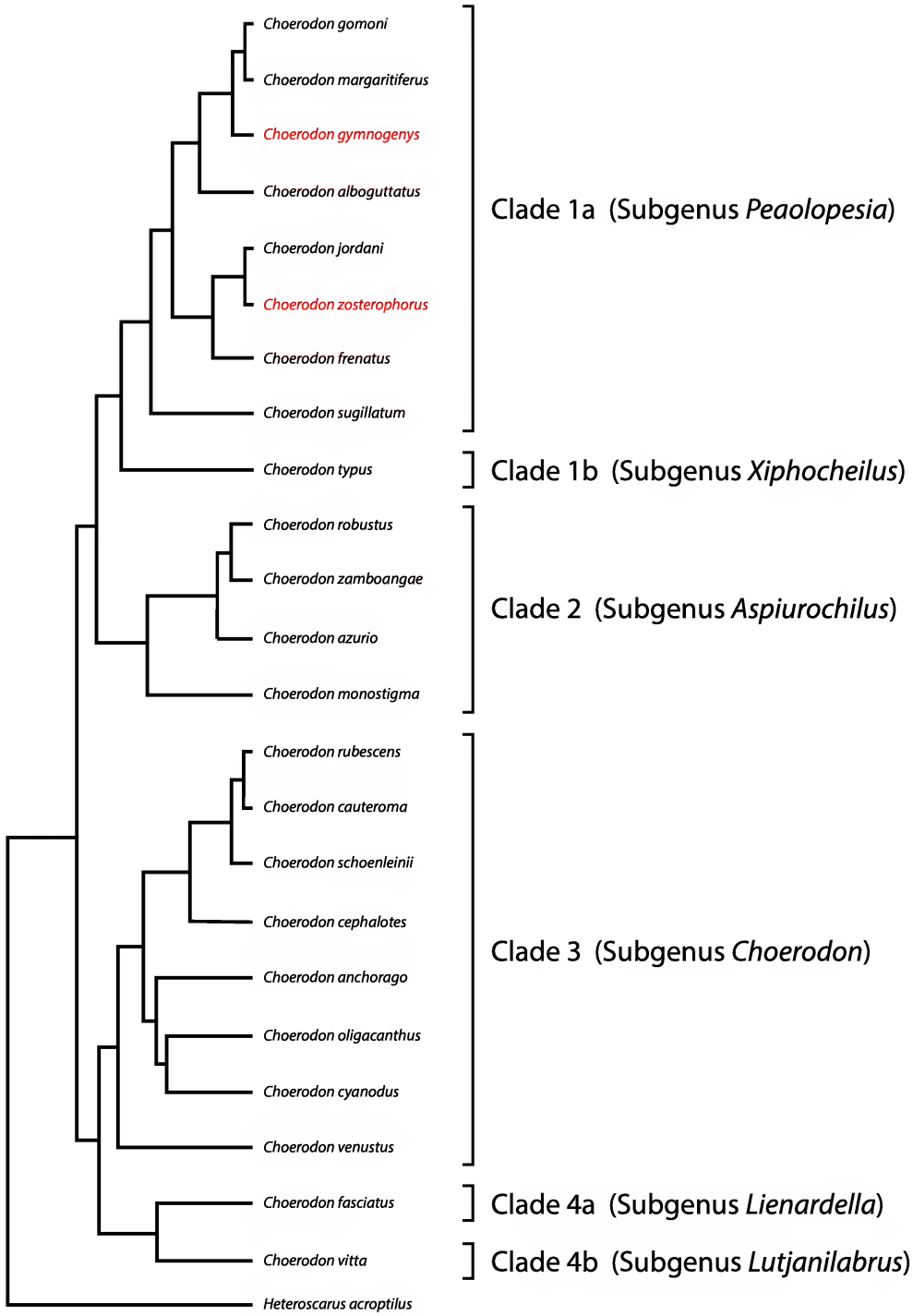

Figure 1. Redrafted "Fig. 1" of Puckridge *et al.* (2015) with two additional species of *Choerodon* (red) inserted following a reassessment of the original data set plus 17 new sequences, employing the methodology of the authors. The composition of clades is the same as hypothesised by Puckridge *et al.* (2015) with two clades subdivided to reflect divergence inherent in the morphology of component species.

Table 1. Proposed scientific names for species referrable to the genus *Choerodon* with their current statuses.

Nominal species Author, Publication date	**Senior synonym**
Choerops albiqena De Vis, 1885	*Choerodon cyanodus*
Choerodon albofasciatus Gomon, 2017	*Choerodon albofasciatus*
Choerodon ambiguus Ogilby, 1910	*Choerodon venustus*
Sparus anchorago Bloch, 1791	*Choerodon anchorago*
Lachnolaimus arilca Richardson, 1848	*Choerodon cyanodus*
Choerodon aurulentus Gomon, 2017	*Choerodon aurulentus*
Torresia australis Castelnau, 1875	*Choerodon schoenleinii*
Choerops azurio Jordan & Snyder, 1901	*Choerodon azurio*
Choerodon balerensis Herre, 1950	*Choerodon fasciatus*
Choerops brenchleyi Günther, 1872	*Choerodon zosterophorus*
Choerodon cauteroma Gomon & Allen, 1987	*Choerodon cauteroma*
Choerops cephalotes Castelnau, 1875	*Choerodon cephalotes*
Chaerops crassus Castelnau, 1875	*Choerodon cyanodus*
Labrus cyanodus Richardson, 1843	*Choerodon cyanodus*
Cossyphus cyanostolus Richardson, 1846	*Choerodon schoenleinii*
Choerodon cypselurus Gomon, 2017	*Choerodon cypselurus*
Choerops dodecacanthus Bleeker, 1868	*Choerodon robustus*
Xiphochilus fasciatus Günther, 1867	*Choerodon fasciatus*
Choerodon frenatus Ogilby, 1910	*Choerodon frenatus*
Choerodon gomoni Allen & Randall, 2002	*Choerodon gomoni*
Choerops graphicus De Vis, 1885	*Choerodon graphicus*
Xiphochilus gymnogenys Playfair & Günther, 1867	*Choerodon gymnogenys*
Choerops Hodgkinsonii Saville-Kent, 1893	*Choerodon cephalotes*
Choerodonoides japonicus Kamohara, l958	*Choerodon albofasciatus*
Labrus japonicus Valenciennes, *in* Cuvier & Valenciennes, 1839	*Choerodon azurio*
Choerops jordani Snyder, 1908	*Choerodon jordani*
Crenilabrus leucozona Bleeker, 1858	*Choerodon anchorago*
Torresia lineata De Vis, 1885	*Choerodon schoenleinii*
Choerodon macleayi Ramsay & Ogliby, 1887	*Choerodon cephalotes*
Cossyphus macrodon Bleeker, 1849	*Choerodon anchorago*
Labrus macrodontus Lacepède, 1802	*Choerodon anchorago*
Choerops Maeander Cartier, 1874	*Choerodon anchorago*
Choerodon margaritiferus Fowler & Bean, 1928	*Choerodon margaritiferus*
Cossyphus maxillosus Guichenot, 1865	*Choerodon robustus*
Choerodon melanostigma Fowler & Bean, 1928	*Choerodon zamboangae*
Choerops meleagris Rüppell, 1852	*Choerodon anchorago*
Lepidaplois mirabilis Snyder, 1908	*Choerodon fasciatus*
Choirodon monostigma Ogilby, 1910	*Choerodon monostigma*
Chaerops notatus Alleyne & Macleay, 1877	*Choerodon schoenleinii*
Choerops nyctemblema Jordan & Evermann, 1902	*Choerodon schoenleinii*
Crenilabrus oligacanthus Bleeker, 1851	*Choerodon oligacanthus*
Choerops olivaceus De Vis, 1885	*Choerodon cyanodus*
Cossyphus ommopterus Richardson, 1846	*Choerodon schoenleinii*
Choerops palawanensis Seale, 1910	*Choerodon oligacanthus*
Choerodon paynei Whitley, 1945	*Choerodon cyanodus*
Choerops perpulcher De Vis, 1885	*Choerodon cephalotes*
Choerodon pescadorensis Yu, 1968	*Choerodon zamboangae*
Choerodon quadrifasciatus Yu, 1968	*Choerodon azurio*

Table 1 (cont.). Proposed scientific names for species referrable to the genus *Choerodon* with their current statuses.

Nominal species Author, Publication date	Senior synonym
Xiphochilus quadrimaculatus Günther, 1880	*Choerodon typus*
Xiphochilus robustus Günther, 1862	*Choerodon robustus*
Choerops rubescens Günther, 1862	*Choerodon rubescens*
Choerodon rubidus Scott, 1959	*Choerodon schoenleinii*
Cossyphus Schoenleinii Valenciennes, *in* Cuvier & Valenciennes, 1839	*Choerodon schoenleinii*
Crenilabrus stejnegeri Ishikawa, 1904	*Choerodon azurio*
Choerodon sugillatum Gomon, 1987	*Choerodon sugillatum*
Choerodon transversalis Whitley, 1956	*Choerodon graphicus*
Xiphocheilos typus Bleeker, 1856	*Choerodon typus*
Choerops unimaculatus Cartier, 1874	*Choerodon schoenleinii*
Choerops unimaculatus De Vis, 1885	*Choerodon cyanodus*
Choerops venustus De Vis, 1884	*Choerodon venustus*
Choerodon vitta Ogilby, 1910	*Choerodon vitta*
Choerodon weberi Ogliby, 1911	*Choerodon anchorago*
Choerodon skaiopygmaeus Gomon, 2017	*Choerodon skaiopygmaeus*
Choerops zamboangae Seale & Bean, 1907	*Choerodon zamboangae*
Choerops zosterophorus Bleeker, 1868	*Choerodon zosterophorus*

onto proximal parts of fins. Predorsal scales reaching forward on dorsal midline of head, barely in advance of above centre of eye, not quite to above dorsal end of preopercle or somewhere between. Cheek only partially covered by scales, scales imbricate to embedded, reaching forward to corner of mouth, barely below lower edge of orbit or somewhere between, moderately broad to broad naked margin posteriorly and ventrally on preopercle; subopercle partially scaled to mostly naked, scales confined to 1–3 rows adjacent to ventral edge of preopercle; rows extending forward at most to just short of below anterior extent of ventral preopercular edge, confined to dorsoposterior corner of subopercle at the least; scales in longest row numbering approximately 1–13; lower jaw naked. Lateral line scales each with an unbranched or branched laterosensory canal tube, tube extremely dentritic with irregularly curved branches in some species, best developed in large individuals; centre of second penultimate lateral line scale usually lateral to posterior endge of hypural. Cephalic sensory canal pores numerous but confined to lines or short branches associated with major canals, or extremely numerous covering much of dorsal side of head and snout, often extending onto anterodorsal portion of cheek. Posterior edge of preopercle serrate to smooth. Mouth mostly horizontal, posterior corner situated below point just anterior to forward extent of orbit, positioned slightly posterior to centre of eye, or somewhere between; lower lip rather narrow, often mostly obscured by skin flap on upper side of mouth when jaws occluded; upper lip similarly narrow and obscured by skin flap except at anterior end of jaw; posterior end of maxilla never exposed; crease at corner of mouth curved downward. Gill rakers on first arch simple to arborescent.

Upper jaw with 2 prominent anterior canines; a third very small canine often present mesial to first prominent canine and adjacent to symphysis of jaw; first prominent canine nearly equal to or longer than second, almost four times the length of second in some species; both canines directed mostly ventrally, first occasionally slightly mesially or slightly laterally, second often slightly laterally, occasionally recurved slightly posteriorly; dental ridge smooth to rough with numerous minute teeth along edge; posterior canine present or absent, usually rather small when present and directed mostly ventrally. Lower jaw with 2 prominent anterior canines; first canine approximately 1/3 to twice the length of second; first canine directed anterodorsally to dorsally and slightly mesially, second canine directed anterodorsally or dorsally to dorsolaterally or curved dorsolaterally to laterally and posteriorly; dental ridge entirely smooth to rough with numerous minute teeth along edge, or mostly smooth or rough edged on the anterior 1/4–2/3 of jaw with approximately 1–10 small to moderately sized caniniform teeth posteriorly; teeth when present in one or two series of a single row; anteriormost teeth usually small, becoming progressively larger posteriorly; second series, when present, uniformly short, 2–4 in number. Vomerine teeth absent.

Dorsal fin continuous, spines subequal, pungent; posterior tips of dorsal and anal fins broadly to narrowly rounded, posterior rays not filamentous; posterior tips of fins reaching short of posterior edge of hypurals, almost midway between hypural edge and posterior edge of scaly caudal fin base, or somewhere between. Posterior edge of caudal fin rounded, slightly pointed midposteriorly, truncate, slightly forked or double emarginate, upper and lower lobes only slightly produced at most. Pectoral fin with upper rays distinctly longer than lower, dorsoposterior corner slightly pointed in some, posterior edge often obliquely straight, lower portion sometimes broadly rounded, but some species with ventralmost rays markedly longer than those above forming a falcate posterior margin of fin, lower arm of crescent distinctly shorter than upper. Pelvic

fin short to long; posterior tip of fin reaching distinctly short of anus to centre of anal fin base, or somewhere between.

Species of this genus are rather variable in size, reaching a small (106 mm SL) to large maximum size, largest specimen examined 530 mm SL, although the same species is reported to reach one metre.

Pigmentation in alcohol. Juveniles often pale dusky with narrow to broad ill-defined darker bands crossing side; prominent often ocellated dark spot frequently present on posterior half of dorsal fin, as well as on other fins in some species; species otherwise variously pigmented.

Initial phase adults often mostly pale or pale dusky, with or without some combination of dusky to dark or distinctly pale spots, blotches, bands or stripes on body and fins.

Terminal phase adults often with distinctive pigmentation differing from that of initial phase adults.

Colour in life. Extremely variable ontogenetically and interspecifically in most.

Distribution. Species of the genus are confined to the Indo-west Pacific, all but one not occurring east of Guam, Palau, the Solomon Islands, Vanuatu and New Caledonia; the sole exception, *Choerodon jordani*, is recorded from Tonga, Fiji and American Samoa. Of the 27 species of *Choerodon*, well over half are present on the Australian plate, with two-thirds of that complement essentially confined to it, while only four are distributed in the western Indian Ocean. Practically all species occur at rather shallow depths, with none known to range below 100 m. Ecologically, most, if not all, prefer back or coral reef areas, or are associated with substrates having similarly low relief.

Etymology. Choerodon is derived from a combination of the masculine Greek nouns *choiros*, "pig", and *odon*, "tooth", in reference to the prominent anterior canines present in species of this genus.

Comments. The 27 species of the genus *Choerodon* are distinguishable from those of all other hypsigenyine genera in having XII, 8 or XIII, 7 dorsal fin rays (XI, 9–11, XII, 9–11, XIII, 9 or XIV–XXVII, 9–11 = 23–44 in others) and 27 total vertebrae (versus 28, 27 in *Anchichoerops* and rarely in *Semicossyphus*, and 14–33 + 14–22 = 31–54 in "odacids"). The rather low number of lateral line scales (26–28 + 2) present in all species is found elsewhere in the subfamily only in the genus *Decodon*. *Choerodon* differs from that genus by dorsal fin formula (XI, 9–10 in *Decodon*), in having fewer vertebrae and in having predorsal scales reaching forward only to above centre of eyes at most (at least to anterior nostril in *Decodon*). Although Gomon (1989) recognised *Xiphocheilus* as a monotypic genus distinct from *Choerodon*, Puckridge *et al.* (2015) recovered it within *Choerodon*, clustering as a sister group with the six species of the subgenus *Peaolopesia* they examined. The recognition of *Xiphocheilus* as a distinct genus appears to have been based on autapomorphic features without valid synapomorphies supporting the monophyly of the remaining species of *Choerodon* examined.

In their study of the interrelationships of 20 species of the genus *Choerodon*, Puckeridge *et al.* (2015) recovered five major clades, with *Choerodon typus* representing a clade sister to the largest clade of species within the genus. On the basis of the same morphological features that supported it as a monotypic genus, the clade is regarded here as a major clade within *Choerodon*, albeit a monotypic one. To further test interrelationships of *Choerodon* species, sequences of an additional 15 individuals, including the two species *C. gymnogenys* and *C. zosterophorus* not previously represented in the analysis, as well as sequences for western Indian Ocean specimens of *Choerodon robustus*, were obtained and together with sequences featuring in the original study reanalysed by L. Teasdale using the methodology employed by Puckridge *et al.* (2015). It was deemed important to include material from the true *C. gymnogenys* because the name had been mistakenly applied over the years to a number of species of similar form distributed in the western Pacific. The outcome supported the confinement of that species to the western Indian Ocean and a sister relationship of it with a terminal clade comprising *Choerodon gomoni* and *C. margaritiferus*. *Choerodon zosterophorus* was recovered as a close sister to *C. jordani* within the larger clade (fig. 1, clade 1a) that includes *C. gymnogenys*. The conspecificity of specimens of *C. robustus* sourced in the western Indian Ocean with those collected in Japan and Indonesia was verified without significant genetic separation between sequences obtained from specimens collected in the widely separated localities. Figure 1 of Puckridge *et al.* (2015) has been redrawn to incorporate these observations (fig. 1) with the newly incorporated taxa in red.

The 27 species of the genus are here referred to six subgeneric clades with the monophyly of each supported by both genetic and morphological evidence. To his credit, Kuiter (2010) foresaw some of this taxonomic arrangement in his image rich treatment of the Labridae. Five subgenera take available group names, with only the monotypic branch comprising *Choerodon vitta* requiring a new epithet.

A number of species of this genus are only poorly represented in collections, especially at juvenile and terminal adult stage sizes. Consequently, ontogenetic changes in colour patterns may not be known for those species. Furthermore, among those species in which juvenile colour patterns are known, a number have rather similar dusky banded pigmentations. The following key, therefore, may be somewhat inadequate for individuals of extreme sizes where only colour characters are utilised in key couplets.

Key to species of the genus *Choerodon*

1. Dorsal fin rays XIII, 7 2

   Dorsal fin rays XII, 8 16

2. Anal fin rays III, 9; vertebrae 11 + 16; a broad pale saddle present on caudal peduncle, extending anteriorly to below posterior end of dorsal fin base; a pale wedge-shaped band present midlaterally on side below about 5th dorsal fin spine; head dusky above level of mouth, covered by tiny pale spots (orange in life) ..... (north-eastern Indian Ocean and western Pacific from southern Japan to north-eastern Australia and New Caledonia) *anchorago*

   Anal fin rays III, 10; vertebrae 10 + 17; colour pattern not as above 3

3. Predorsal scales reaching forward beyond point above posterior extent of orbit on dorsal midline of head, scales lateral to midline reaching to above centre of orbit 4

   Predorsal scales not reaching, or barely reaching, forward to above posterior extent of orbit on dorsal midline of head, scales lateral to midline not reaching much forward of point above posterior extent of orbit 5

4. Second prominent anterior canine distinctly curved posterolaterally; body of moderate depth at dorsal fin origin, 2.7–2.9 into SL; caudal fin slightly forked; body with a prominent dusky stripe on lateral midline; prominent dusky spot present midlaterally at posterior end of caudal peduncle; no dark spot on dorsal fin in adults ..... (northern Australia, south-eastern Indonesia) *vitta*

   Second prominent anterior canine mostly straight, only slightly curved in large specimens, angled dorsolaterally and sometimes slightly posteriorly; body deep at dorsal fin origin, 2.3–2.6 into SL; caudal fin truncate to slightly rounded; body mostly pale with faint broad dusky bands, especially dorsally; prominent ocellated dark spot present on dorsal fin between last few spines ..... (northern Australia, south-eastern Indonesia) *monostigma*

5. Scales on subopercle reaching to or nearly to below anterior extent of ventral preopercular edge; predorsal scales reaching nearly to above posterior extent of orbit on dorsal midline of head (somewhat short of this in very large specimens); body with an anteroventrally angled narrow dusky wedge extending from base of 10th or 11th dorsal fin spine to posterior side of pectoral fin base; body anterior to wedge in adults somewhat dusky, paler posteriorly; juveniles somewhat mottled, but with a faint indication of above pattern and an ocellated dark spot posteriorly on dorsal fin ..... (south-eastern Asia from Japan to Vietnam) *azurio*

   Scales on subopercle not reaching near anterior end of ventral preopercular edge, though extending forward to below midpoint of ventral edge in some species; predorsal scales rarely reaching forward near point above posterior extent of orbit on dorsal midline of head; body not pigmented, as described above 6

6. Body with a prominent anteroventrally directed dark band (occasionally restvricted to a large black spot dorsally on body extending onto ventral portion of dorsal fin between last spine and about fourth segmented ray) associated with a single prominent pale band or pale spot; pectoral fin rays ii, 13 7

   Body with or without dark or pale marks, but not as above; pectoral fin rays ii, 13–17 (ii, 13 in 2 of 11 species) 8

7. Large pale spot situated below posterior end of dorsal fin base, bordered anteriorly by a broad dark band tapering anteroventrally towards pectoral fin base (band extending as dusky segment around ventral and posterior side of pale spot); dorsal edge of caudal fin dark in adults ..... (Japan, Taiwan, southern China; northern Australia, New Caledonia and Fiji) *jordani*

   Broad pale band directed from below base of last few dorsal spines to upper side of pectoral fin base; large dark spot situated dorsally on side and on ventral edge of dorsal fin at dorsoposterior end of pale band, usually extending anteroveritrally as a dark tapering marginal band on pale band at least along posteroventral edge; caudal fin uniformly pale in adults ..... (Indonesia, northern New Guinea) *zosterophorus*

8. Subopercle with 9–11 scales in an anteriorly tapering row; caudal fin slightly forked; pectoral fin narrowly pointed at dorsoposterior tip in large specimens; body pale without distinct pale or dusky to dark markings, only a small dusky spot on each body scale and several dusky marks on head in freshly preserved specimens ..... (north-eastern Australia) *venustus*

   Subopercle with 1–8 scales in an anteriorly tapering row; caudal fin rounded, truncate or slightly double emarginate; pectoral fin broadly pointed or rounded at dorsoposterior tip; body variously pigmented 9

9. Pores on dorsal side of head not numerous, confined to distinct lines corresponding to major cephalic sensory canals 10

   Pores on dorsal side of head extremely numerous, so dense as to obscure position of major cephalic sensory canals 11

10. Body with about 5–7 complete broad dusky bands in juveniles and adults; distinct dark dusky spot centred on lateral line along dusky band below 5th or 6th dorsal fin spine; adults with second prominent anterior canine approximately half the size of the first, directed mostly dorsally ..... (north-eastern Australia, New Caledonia) *graphicus*

    Body with about 5 very faint broad dusky bands dorsally on side in most freshly preserved specimens; large pale spot often present below posterior end of caudal fin of adults; no dark dusky spot present on side below 5th or 6th dorsal fin spine in individuals of any size; adults with second prominent anterior canine approximately the same size as first, second canine slanted dorsolaterally ..... (northern Australia) *cyanodus*

11. Subopercle with 6–10 scales, scales extending anteriorly at least to below midpoint on ventral preopercular edge; pectoral fin rays ii, 13–15 (rarely 15) 12

    Subopercle with 1–5 scales, scales distinctly not extending anteriorly to below midpoint on ventral preopercular edge; pectoral fin rays ii, 15–17 (rarely 15) 13

12. Second prominent anterior canine in lower jaw distinctly larger than first, directed strongly laterally and curved posterolaterally; dorsal outline of head in adults strongly curved above eyes in lateral aspect, nape nearly horizontal to just behind eyes; pectoral fin rays ii, 13–14 (rarely 14); pigmentation in alcohol uniformly pale (colour in life rosy, though somewhat browner above, a blue spot present on each body scale) ..... (north-eastern Australia) *frenatus*

Second prominent anterior canine in lower jaw approximately equal in size to first, directed mostly dorsally and slightly anterolaterally; dorsal outline of head with gentle convex curve from origin of dorsal fin to tip of snout in lateral aspect; pectoral fin rays ii, 14–15 (rarely 15); pigmentation in alcohol pale to slightly dusky, often with a distinct dusky spot on side immediately below posterior end of dorsal fin base; an elongated pale spot often present just above lateral line under anterior half of dorsal fin (colour in life orange with light grey longitudinal stripes, a large bright yellow oval spot on side above lateral line and below anterior half of dorsal fin ..... (south-eastern Asia, Indonesia, Philippines) *oligacanthus*

13. Body rather uniformly dusky without distinct dusky to dark markings; underside of mouth pale; pectoral fin pale; head covered with extremely numerous fine pale dots (evident only on close inspection); forehead and snout not crossed by alternating pale and dusky stripes ..... (south-western Australia) *rubescens*

    Body pale to slightly dusky with a dark spot or dusky blotch on side, or head covered with many small pale spots and forehead crossed by 4 or 5 sets of alternating dusky and pale stripes 14

14. Pectoral fin rays ii, 14–15; a prominent dark spot or anteroventrally angled dark slash on side, located mostly above lateral line under about 6th dorsal fin spine ..... (north-western Australia) *cauteroma*

    Pectoral fin rays ii, 16–17; no prominent dark spots or slash on side below 6th dorsal fin spine 15

15. Moderately small but prominent dark spot present on body at base of last dorsal fin spine (spot not extending onto fin membrane); body scales (each with a blue centre in life) forming horizontal rows of spots on side; second prominent anterior canine in lower jaw distinctly shorter than first in adults, directed mostly dorsally and slightly anteriorly; 3–5 scales on subopercle ..... (western Pacific, China and Japan to northern Australia) *schoenleinii*

    No small prominent black spot on side; horizontally elongated dusky blotch present below centre of fin in some specimens; head with many small pale spots on cheek (orange in life), forehead crossed by 4 or 5 sets of alternating pale and dusky stripes (blue and orange in life); body scales edged with blue giving sides uneven banded appearance; second prominent anterior canine in lower jaw distinctly smaller than first in adults, directed dorsolaterally and curved slightly posteriorly; 1–3 scales on subopercle ..... (northern Australia) *cephalotes*

16. Posterior edge of pectoral fin not produced ventrally (ventral-most rays shorter than those immediately above); scales ventrally on cheek extending forward to or nearly to corner of mouth 17

    Posterior edge of pectoral fin produced ventrally (ventral-most rays distinctly longer than those immediately above); scales ventrally on cheek distinctly not extending forward to corner of mouth 21

17. Body shallow, 24.6–33.7% SL; snout short 8.3–9.8% SL; subopercle covered by about 5 large scales forward to about anterior end of ventral preopercular margin ..... (north-eastern Indian Ocean; western Pacific, China to north-eastern Australia) *typus*

    Body deep, 36.1–44.0% SL; snout long 12.3–16.7% SL; much of subopercle naked with 1–3 rows of about 7–10 small scales adjacent preopercular edge extending forward nearly to anterior end of ventral preopercular margin 18

18. Pectoral fin ii, 13; predorsal scales approximately 10–14, reaching forward in advance of above posterior extent of orbit on dorsal midline of head; body with about 7 or 8 pairs of alternating prominent pale and dusky to dark bands (bands red, blue, white and black in life) ..... (Japan, Taiwan, Philippines, eastern Australia, New Caledonia) *fasciatus*

    Pectoral fin ii, 14; predorsal scales approximately 5–8, scales often reaching forward near, but not in advance of above posterior extent of orbit on dorsal midline of head; body without bands or with a single broad anteroventrally slanted dark band 19

19. Caudal fin emarginate, corners distinctly produced, posterior margin of fin concave ..... (Saya de Malha Bank, Indian Ocean) *cypselurus* sp. nov.

    Caudal fin truncate, corners not or very little produced, posterior margin of fin straight 20

20. Line of demarcation between anterodorsal dusky portion of body and posteroventral pale portion extending between posterior end of dorsal fin base and upper side of pectoral fin base, line slightly darker than anterodorsal dusky pigmentation; caudal fin dusky with fine pale and dusky vermiculations posteriorly and narrow dark dusky dorsal and ventral margins at corners; colour in life brown anterodorsally, white posteroventrally; each body scale with a blue centre in small individuals, forming blue stripes posteriorly on body in larger specimens ..... (Indian Ocean, Japan, Indonesia) *robustus*

    Line of demarcation between anterodorsal dusky portion of body and posteroventral pale portion extending between base of last dorsal fin spine and upper side of pectoral fin base, line not darker than anterodorsal dusky pigmentation; caudal fin pale to slightly dusky with darker periphery; broad anteroventrally tapering reddish brown stripe covering dorsal half of side posterior to greenish brown anterodorsal portion of body in life; reddish brown area edged ventrally by yellow stripe; ventral portion of side white ..... (Japan, Philippines, Indonesia, western Australia) *zamboangae*

21. Scales dorsally on cheek extending forward to or nearly to below anterior extent of orbit; a short dark slash present on side immediately below lateral line under about 3rd dorsal fin spine; body otherwise pale ..... (northern Australia) *sugillatum*

Scales dorsally on cheek not extending forward to below centre of eye; dark slash, if present, on side, below last few dorsal fin spines 22

22. Scales present only on dorsal part of cheek (dorsal part of space between ventral edge of orbit and ventral edge of preopercle); body often pale in preservative (in life with a purplish blue stripe directed dorsoposteriorly from posterior tip of opercular flap to lateral line below last dorsal fin spine); often a second parallel stripe or series of spots present on ventral side of first originating on posterior side of pectoral fin base, consisting of a series of dots on caudal peduncle); no stripe or horizontal series of spots directed posteriorly from centre of eye and extending well onto side ..... (Arabian Gulf to Zanzibar) *gymnogenys*

Scales extending to or below centre of cheek; body mostly pale in preservative, often with dusky or pale stripes or a horizontal series of spots, but not as described above; one stripe or series of spots often emanating from midpoint on posterior edge of orbit and extending well onto side 23

23. Caudal peduncle moderately slender, least depth 8.4–8.5 into SL; width of bony interorbital 16.3–19.6% head length; body pale in preservative with only a single dusky stripe directed horizontally from lateral line below about 8th dorsal fin spine to point immediately below posterior end of dorsal fin base ..... (Somalia coast, Indian Ocean) *skaiopygmaeus* sp. nov.

Caudal peduncle slender to very slender, least depth 8.6–10.9 into SL; width of bony interorbital 19.9–23.9% head length; body usually with one or more continuous or broken pale stripes or horizontal series of spots, sometimes with additional dusky stripes (not as described above) 24

24. Caudal peduncle very slender, 9.4–10.9 into SL; head with narrow pale stripe directed horizontally forward from lower edge of eye extending around tip of snout adjoining stripe from opposite side; side of body with blue to white solid or broken midlateral stripe extending onto base of tail 25

Caudal peduncle slender, 8.6–9.4 into SL; head with pale stripe curving from lower edge of eye to upper jaw near posterior end of mouth, sometimes obscured by overall white colouration below eye; side of body with blue to white continuous or broken stripe angled from above pectoral fin base to dorsal half of caudal peduncle just above lateral midline, stripe distinctly broader anteriorly 26

25. Eye of moderate size, 9.1–9.8% SL, 23.1–25.0% HL; diameter of orbit 85.1–104% snout length; terminal phase individuals with large square dusky (black when fresh) spot just under lateral line below last few dorsal fin spines ..... (eastern Australia, Coral Sea, New Caledonia) *gomoni*

Eye moderately small, 8.3–8.6% SL, 21.6–23.4% HL; diameter of orbit 71.4–83.1% snout length; terminal phase individuals with large square dusky (reddish brown when fresh) spot mostly above lateral line below last few dorsal fin spines ..... (Taiwan, Philippines, Indonesia) *margaritiferus*

26. Cheek scales reaching forward to about anterior end of ventral preopercular margin; single curved white to blue stripe on side of head from eye to upper jaw ..... (Taiwan, Japan, Indonesia, western Australia) *albofasciatus* nom. nov.

Cheek scales reaching forward only to below centre of eye; 2 white to blue curved stripes below curved stripe on side of head from eye to upper jaw ..... (Norfolk Ridge, south-western Pacific) *aurulentus* sp. nov.

Choerodon (*Choerodon*)

Tables 2 & 3

Choerodon Bleeker, 1847: 10, type species – *Labrus macrodontus* Lacepède (= *C. anchorago*) by monotypy (published as *nomen nudum* in Bleeker, 1845: 513).

Choerops Rüppell, 1852: 20, type species – *Choerops meleagris* Rüppell (= *C. anchorago*) by monotypy.

Cossyphodes Bleeker, 1858b: 408, type species – *Labrus macrodontus* Lacepède (= *C. anchorago*) by monotypy.

Hypsigenys Günther, 1861: 383, type species – *Labrus macrodontus* Lacepède (= *C. anchorago*) by monotypy.

Torresia Castelnau, 1875: 36, type species – *Torresia austialis* Castelnau (= *C. schoenleinii*) by monotypy.

Choerodon (*Macrochoerodon*) Fowler & Bean, 1928: 200, type species – *Crenilabrus oligacanthus* Bleeker, 1851 by monotypy.

Diagnosis. Dorsal fin rays XIII, 7; anal fin rays III, 9 or 10; pectoral fin rays ii, 13–16, rarely 17, dorsalmost ray of moderate length 24.9–53.9% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular to broadly rounded; body moderately deep, 31.4–47.3% SL, head depth 23.7–41.0% SL, caudal peduncle depth 11.8–17.8% SL; head blunt, dorsal profile of snout moderately steep, snout length 9.0–18.6% SL; predorsal scales approximately 4–9, reaching forward on dorsal midline, not quite to above posterior edge of preopercle, to about midpoint between posterior extent of orbit and posterior edge of preopercle, or somewhere between; cheek with small partially embedded scales in about 1–10 diagonal rows, posteriormost with about 4–15 scales to upper extent of free preopercular edge, reaching forward to or almost to corner of upper lip crease above mouth, with broad naked margin posteriorly and ventrally on preopercle; 1–3 rows (only about 2 scales in second and third rows when present) of small to moderately large scales on subopercle adjacent preopercular edge extending forward to about anterior end of ventral preopercular margin, confined to upper end of preopercular surface, or reaching somewhere between, with about 1–8 scales in outermost row; each lateral line scale with triple to multiple branching laterosensory canal tube; scales above lateral line about 2½–4½; cephalic sensory canal pores relatively few confined to lines or short branches associated with major canals or numerous; dorsal and anal fins with very low basal sheath comprising 1–5 progressively smaller accessory scales at deepest; posterior lobe of dorsal and anal fins not reaching or reaching just beyond hypural crease; second pair of canines in lower jaw directed anterodorsally and little to strongly laterally, greatly curved in some; caudal fin truncate to

Table 2. Ranges for selected counts and proportional measurements in subgenera of *Choerodon*. "N" designates number of counts or measurements. Aberrant values enclosed by parentheses.

Subgenus [number of species]	*Choerodon* [9]			*Aspiurochilus* [5]			Lienardella [1]			*Lutjanilabrus* [1]			*Xiphocheilus* [1]			*Peaolopesia* [10]		
MERISTIC FEATURES									**N**			**N**			**N**			
Dorsal fin	XIII, 7 (6)			XII, 8 or XIII, 7			XII, 8		12	XIII, 7		11	XII, 8		21	XII, 8 or XIII, 7		
Anal fin	III, 9 or 10			III, 10			III, 10		12	III, 10		11	III, 10 (11)		21	III, 10		
Pectoral fin	ii, 13–17 (8)			ii, 14 (15)			II, 13		12	II, 14		20	II, 14 (12, 13, 15)		52	ii, 13 (14)		
Vertebrae	10+17 or 11+16 = 27			10+17=27			10+17=27		10	10+17=27		10	11+16 (12+15)=27		21	10+17=27		
MORPHOMETRIC FEATURES																		
Standard length (mm)	58.6–410			58.6–308			95.8–182			63.9–174			51.6–123			44.7–181		
% SL	**range**	**mean**	**N**	**range**	**mean**	**N**	**range**	**mean**	**N**	**range**	**mean**	**N**	**range**	**mean**	**N**	**range**	**mean**	**N**
Body depth	31.4 – 47.3	35.3	144	31.5 – 45.9	35.9	74	39.2 – 44.7	42.7	15	29.8 – 39.6	35.2	16	24.6 – 31.5	28.7	11	24.4 – 37.7	28.2	116
Caudal peduncle depth	11.8 – 17.8	13.0	112	12.2 – 16.8	13.5	57	15.1 – 17.1	16.0	15	12.0 – 14.9	14.0	12	12.7 – 15.2	13.6	11	9.2 – 13.6	10.7	94
Head length	29.4 – 41.5	32.5	146	31.3 – 41.3	33.5	77	34.0 – 36.7	35.2	15	34.8 – 38.7	36.3	15	31.3 – 35.4	33.1	17	33.3 – 43.0	35.9	119
Head depth	23.7 – 41.0	27.0	131	26.6 – 42.2	28.7	75	27.8 – 31.9	29.7	14	22.2 – 31.8	27.3	13	22.1 – 26.9	24.5	12	19.4 – 29.2	21.9	93
Orbit diameter	5.2 – 10.9	5.6	138	5.7 – 11.3	6.9	68	7.5 – 9.6	8.4	15	6.5 – 9.9	8.2	12	6.6 – 8.7	7.8	11	6.0 – 10.4	7.3	116
Interorbital width	5.0 – 10.7	6.2	95	4.7 – 11.2	7.1	56	6.9 – 9.1	8.1	15	7.0 – 8.5	7.7	10	5.0 – 6.8	6.1	14	6.0 – 11.3	7.3	92
Snout length	9.0 – 18.6	11.3	113	9.9 – 16.7	11.4	57	10.5 – 14.9	12.7	15	10.9 – 15.3	12.6	12	7.9 – 9.8	8.7	11	8.0 – 15.5	10.2	93
Dorsal fin base length	43.2 – 61.8	50.3	113	49.7 – 60.3	51.1	56	52.5 – 61.2	56.2	15	49.0 – 56.1	54.4	12	50.2 – 59.7	54.6	11	47.0 – 58.1	50.6	94
Dorsal fin last spine length	7.9 – 15.6	9.0	105	8.0 – 14.7	9.2	55	9.8 – 14.5	12.6	13	8.3 – 12.6	10.3	12	8.5 – 12.1	10.2	14	5.5 – 12.2	7.7	92
Dorsal fin posterior lobe length	10.3 – 23.4	11.8	124	11.1 – 16.8	12.0	6.4	9.9 – 13.1	11.4	14	11.8 – 14.5	13.1	10	13.6 – 17.6	16.2	14	6.4 – 13.9	8.5	92
Anal fin base length	21.1 – 32.3	24.9	113	23.0 – 32.8	23.8	56	24.6 – 28.4	25.9	15	24.8 – 30.2	27.4	12	23.7 – 29.7	26.2	11	21.1 – 29.3	23.3	94
Anal fin posterior lobe length	9.6 – 22.5	11.5	125	10.4 – 19.0	11.2	63	10.2 – 12.4	11.2	15	9.4 – 12.0	11.2	10	11.0 – 19.0	15.6	14	7.2 – 13.0	9.0	93
Pectoral fin length	22.3 – 35.5	25.9	133	18.2 – 33.3	23.5	69	26.9 – 32.0	30.4	15	19.9 – 26.1	22.8	15	20.7 – 26.1	23.5	17	19.4 – 29.4	22.4	97
1st pectoral fin ray length	6.6 – 16.9	9.6	97	6.8 – 14.4	8.0	53	6.2 – 16.8	9.7	13	6.3 – 9.5	7.6	13	5.8 – 7.9	6.7	10	0.7 – 5.1	1.8	87
Pelvic fin length	19.0 – 44.6	21.0	130	17.8 – 24.9	20.1	63	21.1 – 25.6	22.9	15	20.4 – 25.0	23.1	12	18.5 – 26.5	21.8	11	17.3 – 27.3	20.2	93
Caudal fin dorsal lobe length	22.5 – 34.7	24.8	89	23.2 – 31.6	24.3	44	26.5 – 32.5	28.8	13	25.7 – 33.4	30.2	10	21.3 – 26.1	24.4	9	16.2 – 26.0	19.3	75
Caudal fin central ray length	19.0 – 34.1	22.0	97	18.8 – 30.3	21.9	51	22.5 – 28.4	24.7	15	20.0 – 24.6	21.7	10	20.0 – 27.7	23.6	14	15.4 – 24.8	17.0	92

Table 2 (cont.). Ranges for selected counts and proportional measurements in subgenera of *Choerodon*. "N" designates number of counts or measurements. Aberrant values enclosed by parentheses.

Subgenus [number of species]	*Choerodon* [9]			*Aspiurochilus* [5]			Lienardella [1]			*Lutjanilabrus* [1]			*Xiphocheilus* [1]			*Peaolopesia* [10]		
MORPHOMETRIC FEATURES																		
Head length (mm)	21.2–152			21.5–115			34.2–62.3			23.4–61.6			23.5–41.8			16.1–69.1		
% HL	**range**	**mean**	**N**	**range**	**mean**	**N**	**range**	**mean**	**N**	**range**	**mean**	**N**	**range**	**mean**	**N**	**range**	**mean**	**N**
Head depth	67.9 – 116	76.3	131	72.3 – 114	78.1	75	79.5 – 89.7	84.2	14	60.7 – 88.4	75.2	13	67.8 – 80.2	73.6	12	51.5 – 88.5	58.1	93
Orbit diameter	12.9 – 29.4	15.6	137	16.3 – 29.9	18.7	68	21.2 – 27.2	23.9	15	18.4 – 27.1	22.4	12	20.2 – 25.9	23.8	11	17.3 – 29.8	19.2	116
Interorbital width	11.1 – 30.1	17.0	92	13.0 – 31.2	19.6	56	18.9 – 25.6	23.1	15	18.4 – 22.8	21.1	10	15.3 – 20.3	18.5	14	15.3 – 30.7	19.3	92
Snout length	25.5 – 61.2	30.7	112	26.3 – 46.8	31.8	57	30.9 – 43.6	36.1	15	29.9 – 43.1	34.5	12	24.7 – 30.0	26.6	11	23.1 – 38.6	27.1	93
x 100%																		
1st pectoral fin ray/pectoral fin length	24.9 – 53.9	33.0	95	23.9 – 45.2	28.0	54	21.3 – 52.6	31.6	13	25.5 – 41.7	32.9	13	24.6 – 33.8	27.6	10	2.8 – 18.3	7.5	85
Orbit diameter/Snout length	28.5 – 95.4	35.2	110	37.5 – 114	46.1	57	50.0 – 79.8	67.3	13	42.6 – 90.6	66.1	12	70.3 – 100	89.3	10	46.1 – 105	61.5	93

Table 3. Ranges for selected counts and proportional measurements in species of the subgenus *Choerodon*. "N" designates number of counts or measurements. Aberrant values enclosed by parentheses.

Species	*C. anchorago*		*C. cauteroma*		C. cephalotes		*C. cyanodus*		*C. graphicus*		*C. oligacanthus*		*C. rubescens*		*C. schoenleinii*		*C. venustus*	
MERISTIC FEATURES		**N**		**N**		**N**		**N**		**N**		**N**		**N**		**N**		**N**
Dorsal fin	XIII, 7	14	XIII, 7	19	XIII, 7	15	XIII, 7	21	XIII, 7	10	XIII, 7	11	XIII, 7	10	XIII, 7	15	XIII, 7	11
Anal fin	III, 9	14	III, 10	19	III, 10	15	III, 10	21	III, 10	10	III, 10	11	III, 10	10	III, 10	15	III, 10	11
Pectoral fin	ii, 13 (8, 14)	25	ii, 15	42	ii, 16 or 17	26	ii, 14 (13, 15)	36	ii, 14	20	ii, 14 (15)	26	ii, 16 (15)	13	ii, 16 (17)	40	ii, 14	20
Vertebrae	11 + 16 = 27	10	10 + 17 = 27	19	10 + 17 = 27	11	10 + 17 = 27	12	10 + 17 = 27	8	10 + 17 = 27	10	10 + 17(16) = 27(26)	9	10 + 17 = 27	10	10 + 17 = 27	10
MORPHOMETRIC FEATURES																		
Standard length (mm)	64.8–273		88.9–208		58.6–266		61.7–247		94.1–368		88.6–250		67.7–380		60.5–410		66.3–355	
% SL	**range**	**mean N**	**range**	**mean N**	**range**	**mean N**	**range**	**mean N**	**range**	**mean N**	**range**	**mean N**	**range**	**mean N**	**range**	**mean N**	**range**	**mean N**
Body depth	37.0–45	40.9 22	36.3–44.0	39.9 21	37.0–42.2	39.1 14	33.2–47.3	37.6 17	35.3–44.2	40.9 11	31.4–39.3	34.9 10	38.1–42.6	40.7 9	32.8–43.4	39.7 26	36.4–41.5	39.5 14
Caudal peduncle depth	12.3–17.3	15.7 15	14.0–17.0	15.6 10	12.1–17.8	15.2 14	12.7–16.8	15.1 17	14.5–17.2	15.9 10	13.4–14.5	14.1 10	13.4–16.5	15.1 9	11.8–16.4	14.4 14	12.9–15.0	13.7 13
Head length	33.6–38.8	37.4 23	31.5–35.7	33.3 10	29.9–39.3	35.0 17	33.9–41.5	37.3 19	34.5–38.7	36.9 12	32.2–36.5	34.3 13	33.2–36.8	35.0 10	29.4–37.1	33.6 28	34.7–38.5	36.4 14
Head depth	28.5–37.9	33.8 23	27.7–33.7	29.2 10	27.9–36.8	32.3 14	27.4–41.0	30.9 14	27.4–35.1	30.7 11	24.4–33.4	28.2 13	29.8–36.1	32.8 9	23.7–38.5	32.1 25	26.1–37.2	31.9 12
Orbit diameter	5.2–10.9	7.6 19	7.2–9.5	8.4 10	5.2–10.1	7.8 16	6.1–9.3	7.5 18	5.2–8.7	7.3 12	5.2–8.0	6.7 12	5.3–9.5	7.1 10	5.4–10.6	7.1 27	5.9–10.3	8.7 14
Interorbital width	6.5–8.7	7.8 14	5.9–7.3	6.5 10	5.3–7.7	6.8 9	5.7–7.5	6.5 12	7.3–9.2	8.1 9	5.0–6.6	5.5 10	7.1–9.2	8.2 9	6.2–10.2	8.2 11	7.0–10.7	7.8 11
Snout length	12.0–18.3	15.6 15	9.9–15.7	12.0 10	12.8–18.3	15.4 15	10.9–18.0	15.0 16	12.2–16.3	14.1 10	10.2–16.4	13.0 10	12.3–18.2	15.4 10	9.0–16.9	13.0 14	11.9–18.6	14.8 13
Dorsal fin base length	49.8–57.0	54.1 15	53.8–61.1	57.8 10	51.1–59.3	55.3 14	46.6–59.1	53.6 17	52.7–60.0	55.8 10	51.6–61.8	56.6 10	51.5–58.7	55.8 10	43.2–60.2	55.6 14	52.5–59.3	55.7 13
Dorsal fin last spine length	8.2–15.6	11.6 15	9.6–13.5	11.8 10	9.3–15.0	12.5 11	9.4–13.8	11.2 13	8.3–14.1	11.7 9	9.9–12.4	11.4 10	7.9–13.5	10.3 10	10.1–14.3	12.4 14	8.6–14.2	11.2 13
Dorsal fin posterior lobe length	11.0–16.7	13.9 21	12.9–14.7	14.0 10	13.0–23.4	16.9 13	12.1–16.4	14.1 14	12.5–18.0	15.1 11	12.7–21.4	16.2 11	10.9–14.4	13.0 9	10.9–14.8	13.5 23	10.3–13.3	12.0 12
Anal fin base length	21.2–27.1	24.7 15	26.3–30.5	28.7 10	26.3–31.6	28.9 14	24.8–28.8	26.8 17	25.7–30.7	28.4 10	25.9–32.0	29.1 10	26.1–31.1	28.6 10	21.1–30.8	27.6 14	26.4–32.3	28.4 13
Anal fin posterior lobe length	11.2–15.3	13.5 21	11.9–14.5	13.2 10	12.5–22.5	17.0 13	12.0–16.7	14.1 14	13.7–17.4	15.5 11	11.1–21.5	15.6 12	10.9–14.7	12.9 10	9.6–14.3	13.0 22	10.6–12.9	11.7 12
Pectoral fin length	23.4–32.6	30.1 20	27.0–30.5	28.8 10	22.3–29.6	26.3 15	27.3–34.8	30.1 17	28.8–33.7	30.8 10	25.1–27.9	26.8 10	26.3–30.7	28.1 10	25.1–35.5	29.0 27	27.4–34.3	31.4 14
1st pectoral fin ray length	10.9–14.1	12.5 12	12.2–14.1	13.1 10	9.0–14.8	10.9 13	8.9–13.3	11.6 12	10.2–14.6	13.5 9	6.6–11.4	9.8 10	7.5–14.6	11.2 9	12.9–16.9	14.1 11	7.8–13.6	10.8 11
Pelvic fin length	21.7–28.0	24.2 21	21.9–24.1	23.2 10	22.0–33.2	25.3 13	19.0–24.7	22.4 16	21.2–25.5	23.3 10	22.3–44.6	31.1 11	20.1–23.9	21.7 10	19.1–27.3	23.2 25	21.3–22.9	22.2 14
Caudal fin dorsal lobe length	23.1–31.3	26.1 11	28.7–34.7	30.1 9	25.2–30.3	28.1 11	24.1–28.7	26.4 11	22.5–26.5	24.4 9	27.5–30.6	28.6 9	24.1–29.0	27.0 8	24.0–31.2	27.9 10	24.0–31.6	28.3 11
Caudal fin central ray length	19.0–30.6	24.4 13	24.3–30.9	25.7 10	25.3–34.1	29.5 11	21.5–28.0	23.8 13	21.9–27.0	24.8 9	24.3–29.5	26.3 10	21.9–26.3	24.0 8	19.0–29.0	25.3 12	20.9–27.4	23.5 11

Table 3 (cont.). Ranges for selected counts and proportional measurements in species of the subgenus *Choerodon*. "N" designates number of counts or measurements. Aberrant values enclosed by parentheses.

Species	*C. anchorago*			*C. cauteroma*			C. cephalotes			*C. cyanodus*			*C. graphicus*			*C. oligacanthus*			*C. rubescens*			*C. schoenleinii*			*C. venustus*		
MORPHOMETRIC FEATURES																											
Head length (mm)	24.6–94.4			30.3–67.2			21.2–89.2			23.1–93.9			34.7–136			30.0–86.3			24.3–140			21.7–152			25.5–126		
% HL	**range**	**mean**	**N**	**range**	**mean**	**N**	**range**	**mean**	**N**	**range**	**mean**	**N**	**range**	**mean**	**N**	**range**	**mean**	**N**	**range**	**mean**	**N**	**range**	**mean**	**N**	**range**	**mean**	**N**
Head depth	73.8–102	89.6	22	82.0 – 97.7	87.7	10	77.9–103	91.5	15	72.1–107	82.7	14	77.7–94.9	83.1	11	72.6–96.8	82.4	13	85.5–98.2	93.4	9	77.0–116	96.7	25	67.9–102	87.9	12
Orbit diameter	13.1–28.8	19.2	19	22.8 – 28.2	25.2	10	15.4–27.9	22.2	16	15.7–24.8	20.2	18	14.5–23.9	19.8	12	12.9–23.3	19.1	12	14.4–26.4	20.6	9	14.7–29.4	20.8	27	16.6–28.1	24.0	14
Interorbital width	11.1–23.4	19.4	13	17.4 – 23.3	19.7	10	14.4–23.0	19.3	9	15.4–19.7	17.2	11	19.9–24.0	22.0	9	15.0–19.7	16.1	10	20.2–25.7	23.3	9	20.4–28.7	24.1	10	18.9–30.1	21.4	11
Snout length	25.5–52.4	39.1	15	29.1 – 44.0	36.2	10	35.3–61.2	44.5	15	26.2–49.0	40.2	16	34.1–43.0	38.1	10	30.0–46.3	38.0	10	34.7–49.6	44.0	9	30.7–46.2	38.8	14	31.0–51.1	40.8	13
x 100%																											
1st pectoral fin ray/ pectoral fin length	35.0–44.9	39.9	11	41.3 – 52.4	45.6	10	36.4–53.1	41.4	13	29.9–44.3	38.6	12	35.4–47.9	43.9	9	26.1–42.8	36.4	10	26.8–50.3	39.6	9	41.5–53.9	48.0	10	24.9–46.8	34.6	11
Orbit diameter/Snout length	29.3–90.9	53.5	15	55.3 – 88.2	70.8	10	28.5–74.5	52.9	15	35.9–69.5	52.1	16	34.2–69.2	55.8	9	37.2–76.3	55.6	10	31.3–76.0	48.6	9	32.4–95.4	60.8	13	32.5–82.3	60.4	13

distinctly rounded or with concave posterior profile. (See Table 1 for additional meristic and morphometric ranges.) Usually separate juvenile, initial phase and terminal phase colour patterns.

Reaches moderately large maximum size, one or more species reported to attain a metre SL.

Comments. As the second largest subgenus of *Choerodon*, this complex comprises nine species, most of which reach a larger size than those of other subgenera. Two are widely distributed in the western Pacific, one also occurring in the north-eastern Indian Ocean. The evolutionary hypothesis presented by Puckridge *et al.* (2015) implies clades within the major (subgeneric) clades, the largest within this subgenus comprising at least four species, *C. cephalotes*, *C. cauteroma*, *C. rubescens* and *C. schoenleinii* (fig. 1, clade 3). Morphological support for this clade includes a reduction in subopercular squamation and the highest number of branched pectoral fin rays, regularly 15–17. A species of *Choerodon* not included in the genetic analysis, *C. graphicus*, is of similar body form to others in the subgenus, shares the reduced subopercular squamation and is likely to be a member of this clade. A second clade within the subgenus comprises *C. anchorago*, *C. cyanodus* and *Choerodon oligocanthus*.

The four earliest group names proposed for the subgenus were all based on the type species, *C. anchorago*, albeit in reference to two of its junior synonyms. Early confusion undoubtedly arose from limited communication during the 14 years between the publication of the first and last of the four names, although a justification for Bleeker's second name *Cossyphodes* was not provided (Gill, 1908; Gomon, 1997). Castelnau (1875) was certainly familiar with the genus *Choerodon* because he treated three species assigned to the genus (as *Chaerops*) in the publication in which he presented his new *Torresia*, but probably failed to make the generic link because of the juvenile form of his type specimen. *Torresia australis* appears to be a junior synonym of *C. schoenleinii*. *Macrochoerodon* was proposed as a subgenus by Fowler and Bean (1928) to distinguish *C. oligacanthus* from other species of *Choerodon* by its elongate pelvic fins, which extend past the anal fin origin in adults. In all other regards, the species is consistent with those of the subgenus.

Choerodon anchorago (Bloch, 1791)
Anchor Tuskfish

Figures 2, 3; table 3; appendix.

Sparus anchorago Bloch, 1791: 108, pl. 276, locality unknown.

Labrus macrodontus Lacepède, 1802: 451, 522, locality unknown, specimen sent to France from Holland.

Cossyphus macrodon Bleeker, 1847: 10, emendation of *Labrus macrodontus* Lacepède.

Choerops meleagris Rüppell, 1852: 20, Mare javanicum (Java Sea).

Crenilabrus leucozona Bleeker, 1858a: 20, Biliton (Indonesia).

Choerops Maeander Cartier, 1874: 102, Cebu (Philippines).

Choerodon weberi Ogliby, 1911: 52, (listed as *Chaerodon weberi* on p. 36), Dobo, Aru Islands (Indonesia).

Diagnosis. Dorsal fin rays XIII, 7; anal fin rays III, 9; pectoral fin rays ii, 13, rarely 14, dorsalmost ray of moderate length 35.0–44.9% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular; body deep, 37.0–45.1% SL, head depth 28.5–37.9% SL, caudal peduncle depth 12.3–17.3% SL; head bluntly pointed, dorsal profile of snout moderately steep, snout length 12.0–18.3% SL; predorsal scales approximately 7–9, reaching forward on dorsal midline to about midpoint between posterior extent of orbit and posterior edge of preopercle; cheek with small partially embedded scales in about 7–10 diagonal rows, posteriormost with about 9–15 scales to upper extent of free preopercular edge, reaching forward to or almost to corner of upper lip crease above mouth, with broad naked margin posteriorly and ventrally on preopercle; 1 or 2 rows (only about 2 scales in second row when present) of small scales on subopercle adjacent preopercular edge extending forward to about anterior end of ventral preopercular margin, with about 8 scales in outermost row; each lateral line scale with multiple branching laterosensory canal tube; scales above lateral line about 3½; cephalic sensory canal pores relatively few confined to lines or short branches associated with major canals; second pair of canines in lower jaw directed anterodorsally and slightly laterally; dorsal and anal fins with very low basal sheath comprising 2 or 3 progressively smaller accessory scales at deepest; posterior lobe of dorsal and anal fins reaching to or beyond hypural crease; caudal fin truncate, corners rounded to square; pelvic fin reaching to or just short of anus, length 21.7–28.0% SL. (See Table 3 for additional meristic and morphometric ranges.) Adults with upper third of body and head above mouth dark grey, white below, with dorsally tapering vertical white or yellow band below central dorsal fin spines and white saddle-like blotch covering top of caudal pecuncle forward to bases of middle segmented dorsal fin rays; head peppered with fine orange spots in life.

Reaches moderately large maximum size, largest specimen examined 273 mm SL.

Pigmentation in alcohol. Juveniles dark dusky with 5 vertical narrow pale bands crossing side and 2 horizontal narrow pale stripes extending from behind head to dorsal and ventral sides of caudal peduncle, anterior two pale bands crossing nape; head similarly dusky dark with pale dorsal margin to eye, mid-dorsal pale stripe covering top of snout to above eye, horizontal pale stripe along underside of eye and pale marks on ventral surface below eye, low on operculum and on chest; small dark spots on dorsal and ventral profiles midway along and at posterior corners of caudal peduncle and at centre of caudal fin base, on leading edge, midway along and at posterior base of dorsal fin, on leading edge and at posterior base of anal fin, and extending from pectoral fin base along leading edge of pelvic fin. Larger juveniles dusky with pale underside and narrow remnants of 5 pale bands, 3rd band just posterior to pectoral fin and 5th band across anterior end of caudal peduncle most prominent; base of pectoral fin with large dark spot. Initial phase adults dusky above and pale below upper end of pectoral fin base, distinct demarcation on head at horizontal from corner of mouth; side with pale underside extending upward as

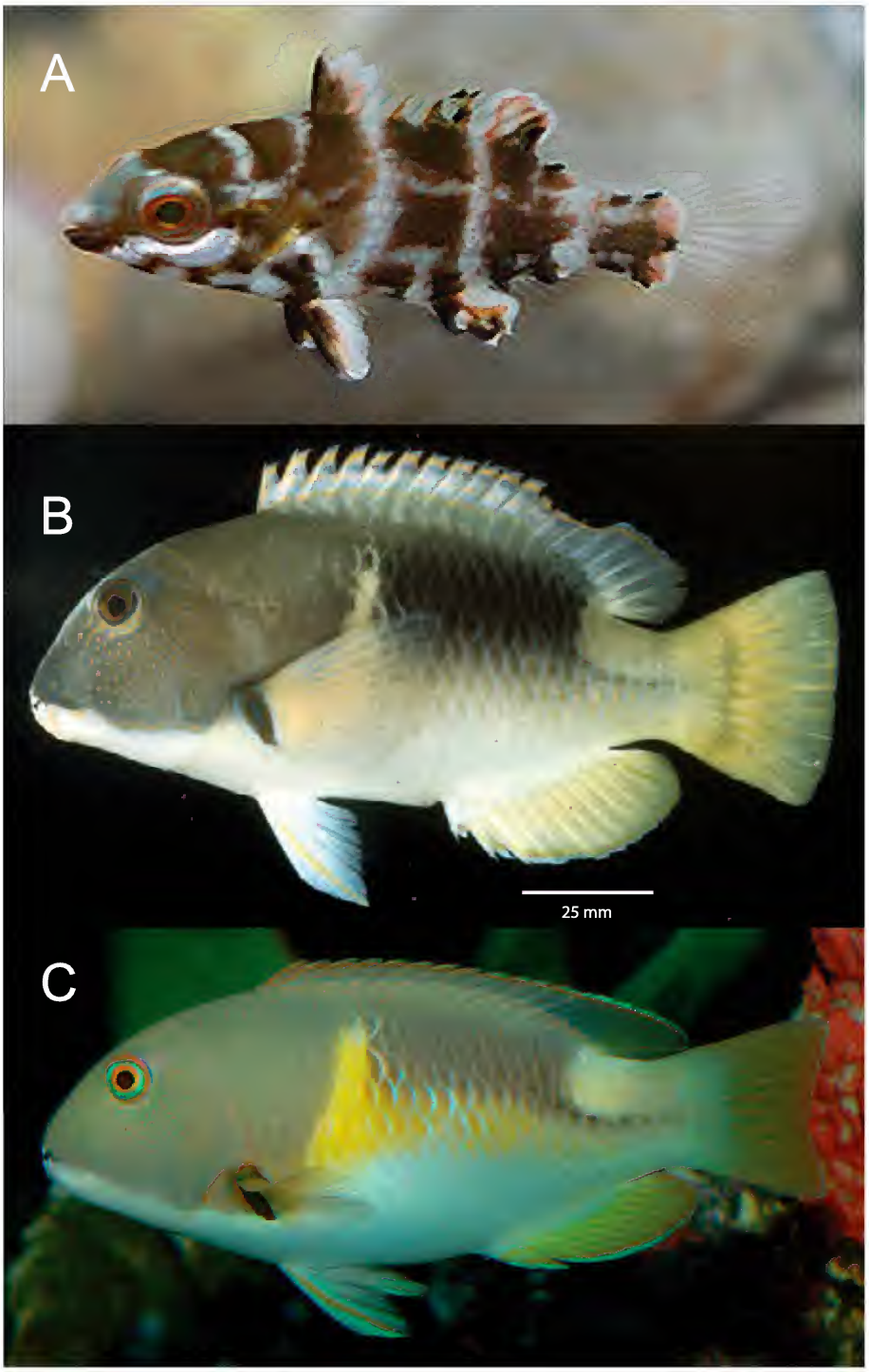

Figure 2. *Choerodon anchorago.* A, Juvenile, Amami Ōshima Island, Ryukyu Islands, Japan, photo by S. Sato; B, Initial phase adult, BPBM 15809, 123 mm SL, Madang, New Guinea Island, Papua New Guinea, photo by J. Randall, BPBM; C, Terminal phase adult, Greek aquarium, photo by Dr G. J. Reclos.

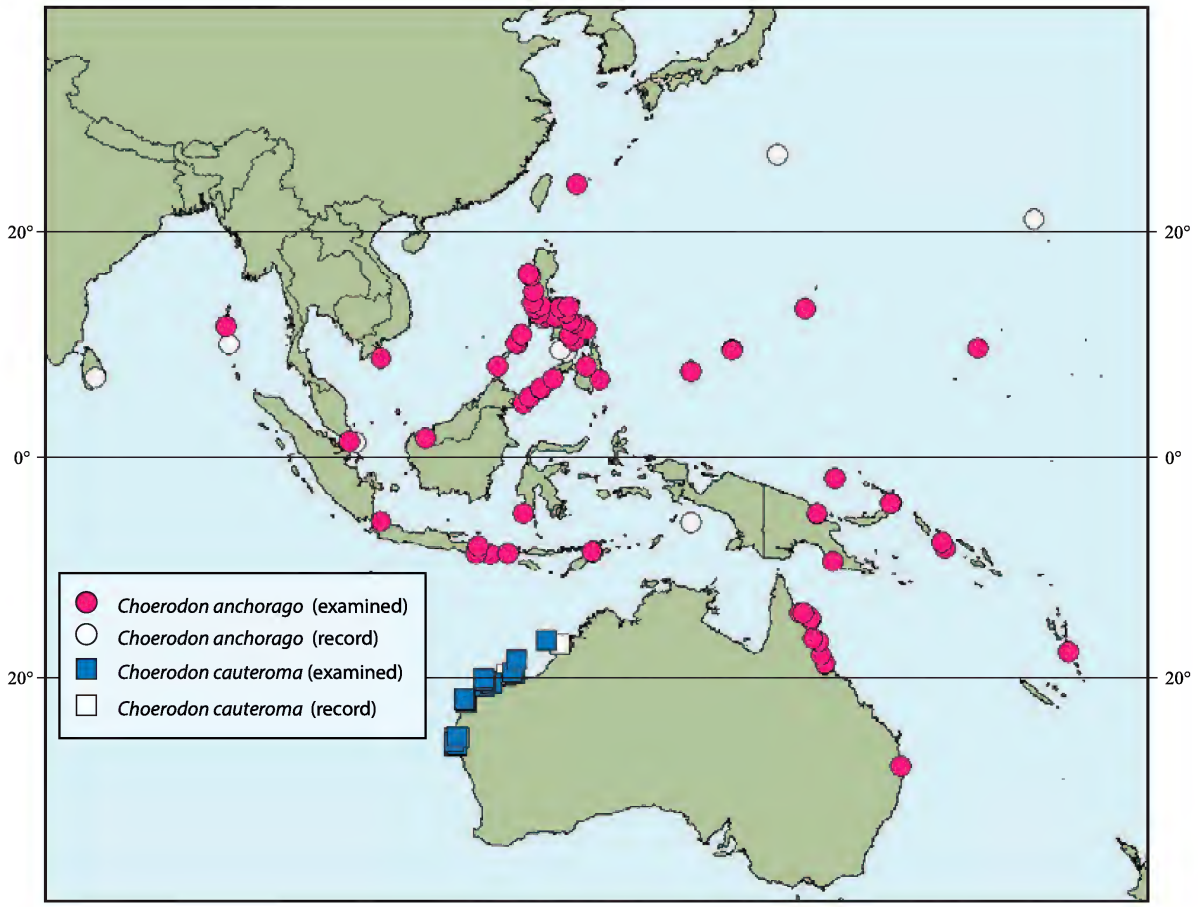

Figure 3. Distributions of *Choerodon anchorago* (circles) and *C. cauteroma* (squares) based on specimens examined (coloured) and collection registration records (white).

dorsally tapering wedge-shaped mark behind pectoral fin with apex reaching lateral line; caudal peduncle pale except for midlateral extension of dusky pigmentation reaching to or almost to caudal fin base; dusky side of head speckled with fine pale spots; pectoral fin base covered by prominent dark spot; dorsal fin dusky above dusky area on side; remainder of dorsal fin and other fins pale. Terminal phase adults similar to initial phase but with pale area on side covering ventral 2/3 of side between front of pale wedge and vertical at middle segmented dorsal fin rays; dusky and pale areas on head and anterior end of side separated by distinctly dark margin.

Fresh colours. Juveniles olive brown to brown with 5 narrow white bands, first two crossing predorsal, third below 4th or 5th dorsal fin spines, 4th below last couple of dorsal fin spines and 5th at posterior end of dorsal fin base (fig. 2A); 2 narrow white stripes originating above and below pectoral fin base and terminating on base of caudal fin; head brown dorsally with broad white stripe under eye and narrow white stripe above eye. Dorsal, anal and pelvic fins same colour as side adjacent with continuation of white bands on side, white ocellated black spot near middle of segmented ray portion of dorsal and anal fins and dorsally and ventrally on caudal fin base, ocelli with red surround in small individuals; caudal and pectoral fins hyaline (Okamura & Amaoka, 1997: 465, left second from top; Chen *et al.*, 2010: 380 & 381, figs D & E; Kuiter, 2010: 51, fig. D; Allen & Erdmann, 2012: 645, left side fig. in middle of page).

Initial phase adults purplish grey dorsally with ventral half white (fig. 2B); prominent white wedge-shaped bar on side just posterior to pectoral fin and white rectangular blotch covering dorsal half of caudal peduncle and side below last 2 dorsal fin rays; pectoral fin base with black-orange-black ocellated spot; head with numerous fine orange spots, orange horizontal line from corner of mouth, several orange lines on chin. Dorsal fin purplish grey with 3 horizontal orange stripes anteriorly, one submarginal posteriorly, yellowish white basoposteriorly. Anal fin yellow with light purple margin and orange submarginal stripe. Caudal and pectoral fins yellowish orange.

Pelvic fin white with lengthwise stripe just posterior to leading edge (Okamura & Amaoka, 1997: 465, left bottom; Chen *et al.*, 2010: 381, fig. F; Kuiter, 2010: 51, figs B & F; Allen & Erdmann, 2012: 645).

Terminal phase adults blacker posterodorsally (fig. 2C); wedge-shaped bar orange with broad orange streak extending posteriorly on lateral midline; pectoral fin base covered with large black spot preceded by orange marks; very broad black stripe on upper lip to opercular edge. Dorsal fin black anteriorly on soft portion, white posteriorly with narrow orange lines. Anal fin white with several narrow orange longitudinal lines breaking up into spots posteriorly. Caudal fin black, orange somewhat distally with narrow blue marginal line. Pelvic fin with 1 or 2 additional orange lines (Shen, 1993: pl. 143, fig. 10; Okamura & Amaoka, 1997: 465, left second from bottom; Shibukawa, Peristiwady & Suharti, in Kimura & Matsuura, 2003: 147; Kuiter, 2010: 51, figs C & G; White *et al.*, 2013: 265, fig. 89.13).

Etymology. The name *anchorago* may refer to an anchor-like colour pattern, as perceived by its author.

Distribution. One of the most widely distributed species in the genus (fig. 3), recorded from Sri Lanka (Munro 1955:185), Nicobars and Andaman Islands in the north-eastern Indian Ocean, throughout the tropical western Pacific from southernmost Japan and the Ogasawara Islands (Randall *et al.*, 1997: 45) to the northern Great Barrier Reef in north-eastern Australia, eastward to Palau and Yap in Micronesia (Myers, 1999: 189), Solomons, Vanuatu and New Caledonia (Fricke and Kulbicki, 2006: 386). Occurs in coastal seagrass and sandy areas with mixed coral and rubble to depths of about 25 m.

Comments. The specimens on which Bloch (1791) and Lacepède (1802) based their descriptions of *Sparus anchorago* and *Labrus macrodontus*, respectively, were acquired from the Netherlands, presumably from auctions, and lacked provenance. Although Bloch's accompanying figure (1791, pl. 276) did not accurately portray the distinctive colour pattern of this species, the morphological description, including dorsal, anal and pectoral fin ray counts, is diagnostic for this species. Paepke (1999: 92) identified two specimens in the Berlin Zoological Museum collection as types, one of which has apparently been lost, and designated the extant specimen (ZMB 2476) as lectotype. The type of Lacepède's description is likewise identifiable as this species by the same characters, as is the type specimen (MNHN A.8208). Bleeker (1849) emended Lacepède's name to *Cossyphus macrodon* without justification and based his detailed description on three specimens from Batavia (Java, Indonesia).

Choerops meleagris, the type species of Rüppell's (1852) new genus, was presented only with a description of morphological features, which are common to species of the genus. The Senckenberg Museum type (SMF 2759, 263 mm SL) is a dried specimen clearly identifiable as *C. anchorago*. The type of Bleeker's (1858) *Crenilabrus leucozona*, now in the British Museum (BMNH 1864.5.15.18), is a 34.3 mm SL (42 mm TL) specimen with the characteristic meristic values and juvenile colouration of *C. anchorago*. *Choerops Maeander* Cartier, 1874 was based on juveniles according to the lengths of his type series 3.9–6.7 cm from Cebu in the Philippines. Although the types were not located, Cartier's account includes a detailed description that matches the juvenile colouration of *C. anchorago*, and his anal fin count of "3/9" (III, 9) is unique for that species within the genus. Ogilby's *C. weberi* was based on seven specimens, 121–197 mm, from Dobo, Aru Islands, three of which (QMB I.20, I.1532, and I.10133) are still present in the Queensland Museum collection. The species is synonymous with *C. anchorago*.

Choerdon anchorago is the most often encountered member of the genus, being found in shallow waters of the central western Pacific, and one of the few ranging westward in the northern part of the Indian Ocean as far as India and Sri Lanka. Its nine segmented dorsal fin rays and vertebral count of 11 + 16 are distinctive for the subgenus and in combination for the family.

Material examined. 163 specimens, 12–273 mm SL; see appendix.

Choerodon cauteroma Gomon & Allen, 1987
Bluespotted Tuskfish

Figures 3, 4; table 3; appendix.

Choerodon sp. 1 Gloerfelt-Tarp and Kailola, 1983: 235, colour figure on opposing page; Sainsbury & Kailola, 1984: 260, colour figure on opposing page.

Choerodon sp. Allen, 1985: 2406, figs 330 & 331.

Choerodon cauteroma Gomon and Allen, 1987: 25. Western Australia, Exmouth Gulf.

Diagnosis. Dorsal fin rays XIII, 7; anal fin rays III, 10; pectoral fin rays ii, 15, rarely 16, dorsalmost ray of moderate length 41.3–52.4% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular; body deep, 36.3–44.0% SL, head depth 27.7–33.7% SL, caudal peduncle depth 14.0–17.0% SL; head blunt, dorsal profile of snout steep, snout length 9.9–15.7% SL; predorsal scales approximately 5–8, reaching forward on dorsal midline to above posterior edge of preopercle; cheek with small partially embedded scales in about 4 or 5 diagonal rows, posteriormost with about 9 or 10 scales to upper extent of free preopercular edge, reaching forward to corner of upper lip crease above mouth, with very broad naked margin posteriorly and ventrally on preopercle; single row of about 5 small scales on subopercle adjacent preopercular edge extending forward about half way to anterior end of ventral preopercular margin; each lateral line scale with multiple branching laterosensory canal tube; scales above lateral line about 4; cephalic sensory canal pores numerous confined to lines or short branches associated with major canals; second pair of canines in lower jaw strongly curved laterally; dorsal and anal fins with very low basal sheath comprising 1–5 progressively smaller accessory scales at deepest; posterior lobe of dorsal and anal fins reaching hypural crease; caudal fin truncate to slightly rounded medially, upper and lower corners slightly produced; pelvic fin reaching to or just short of anus, length 21.9–24.1% SL. (See Table 3 for additional meristic and morphometric ranges.) Tan to green above with white underside and prominent black slash or spot

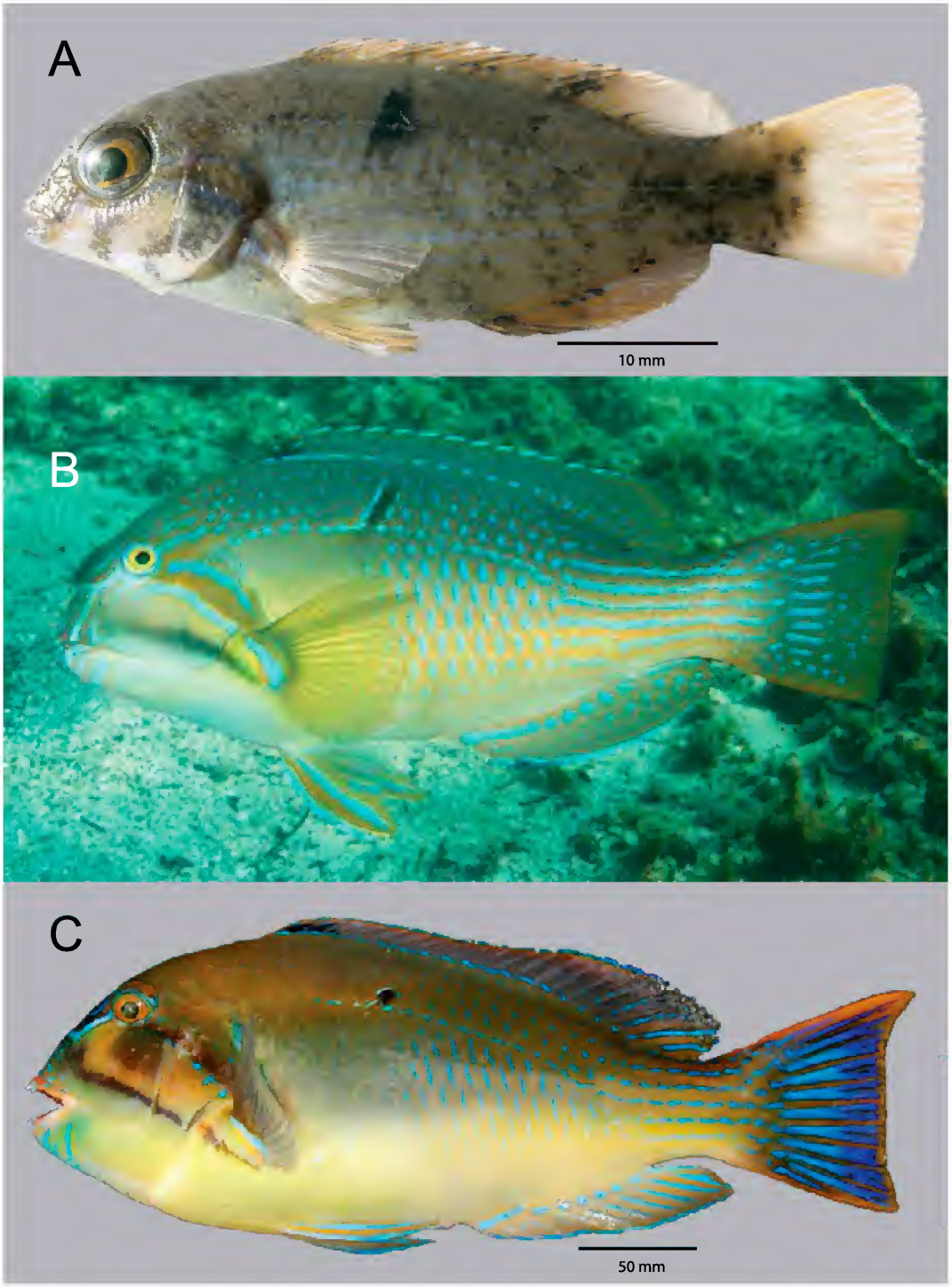

Figure 4. *Choerodon cauteroma*. A, Juvenile, WAM P. 30087-009, 44 mm SL, Useless Loop, Shark Bay, Western Australia, 26° 09' S, 113° 26' E, photo by J. Hutchins, WAM; B, Initial phase adult, Mary Anne Island sanctuary, Shark Bay, Western Australia, photo by J. Shuttleworth; C, Terminal phase adult, approximately 300 mm SL, off Gnaraloo Station, Western Australia, 23.44° S, 113.27° E, photo by L. Malton.

between base of middle dorsal fin spines and lateral line; head with black streak directed posteroventrally from eye and second running posteriorly from above rear of mouth; additional blue lines radiating from eye and blue spot or vertical mark on most body scales, those posteriorly coalescing into horizontal lines; prominent black spot at front of dorsal fin.

Reaches moderately large maximum size, largest specimen examined 259 mm SL.

Pigmentation in alcohol. Juveniles pale with 4 faint dusky bands or vertically elongate blotches on side; darker spot about half diameter of eye on lateral line below 7th dorsal fin spine; fins pale, dusky blotches basally on dorsal and anal fins opposite ends of bands crossing side and dark spot in dorsal fin above 3rd band in very small individuals. Initial phase adults pale with faint dusky stripes posteriorly on side following horizontal scale rows; broad dark slash on side between base of 7th dorsal fin spine and lateral line; head with pair of narrow dusky lines crossing snout in front of eyes, similar pair of dusky lines directed posteriorly from eye, 3rd pair curved posteroventrally from eye across operculum, 4th pair curved anteroventrally from eye to mouth, pair of short dusky marks directed ventrally from mouth and faint dusky streak angled posteroventrally from cheek; dorsal fin with broad horizontal dark streak distally between first 3 spines; dorsal and anal fins with 2 horizontal series of dusky spots, inner series in each fin conjoined to form stripe anteriorly; caudal fin occasionally with 1 or 2 vertical series of dusky spots. Terminal phase adults similar to initial phase but with dark mark dorsally on side reduced to spot of pupil size; lines on head, except for those across snout, directed posteroventrally from eye with streak across cheek less prominent; spot anteriorly on dorsal fin intense.

Fresh colours. Juveniles yellow with blue lines on head and on dorsal and anal fins as in initial phase (fig. 4A); large black spot in position of black mark on side of initial phase (Allen, 1985: 2406, fig. 330, as *Choerodon* species).

Initial phase adults olivaceous above, yellow to white below, centres of scales anteriorly on side bright blue, spots coalescing into blue stripes posteriorly on side following horizontal scale rows (fig. 4B); broad black slash with blue to white anterior margin between base of 7th dorsal fin spine and lateral line; head with pair of narrow blue lines crossing snout in front of eyes, second pair curving posteroventrally from eye and third pair curving posteroventrally from eye across operculum, blue line directed dorsoposteriorly from eye; pair of short blue marks directed ventrally from mouth on each side; brown to black streak angled posteroventrally from cheek across operculum. Fins bright yellow; dorsal fin with broad black streak distally between first 3 spines; dorsal and anal fins with narrow blue margins and blue spots posteriorly; caudal fin spotted with blue. Pectoral fin rays with broad blue stripes basally; pelvic fin with one or more lengthwise blues stripes (Sainsbury & Kailola, 1984: 261, top figure, as *Choerodon* sp. 1; Allen, 1985: 2406, fig. 331, as *Choerodon* species; Kuiter, 2010: 57, fig. A).

Terminal phase adults similar to initial phase but with blue to grey cast above and black slash-like mark reduced to spot (fig. 4C); head with oblique white patch below eye continuing posteriorly on lower half of side. Dorsal, anal, caudal and pelvic fin rays blue; caudal fin green with yellow periphery (Kuiter, 2010: 57, figs C & D).

Etymology. From the Latin *cauteroma* for "brand" in reference to the characteristic brand-like marking dorsally on the side of the body in this species.

Distribution. Confined to coastal waters of tropical Western Australia (fig. 3) from Shark Bay to the Arafura Sea off the Northern Territory (Russell & Houston, 1989: 83; Larson *et al*., 2013: 165). Found on inner reefs with large boulders and in open areas with algal covered rock, sponges and other attached invertebrates at depths of 1.5–150 m.

Comments. This species shares a greatly reduced number of scales on the subopercle with *C. cephalotes*, *C. rubescens* and *C. schoenleinii*, and to a lesser extent *C. graphicus*, which has slightly larger scales in this region. It is easily distinguished from the four by colour pattern, the obvious black slash-like marking on the side above the lateral line and below the middle dorsal fin spines a diagnostic feature. Despite its relatively recent recognition as a distinct species, *C. cauteroma* is particularly common throughout much of its greatly restricted range in Western Australia.

Material examined. 46 specimens examined, 20–259 mm SL; see appendix.

Choerodon cephalotes (Castelnau, 1875)
Purple Tuskfish

Figures 5, 6; table 3; appendix.

Choerops cephalotes Castelnau, 1875: 39, Cape York (Queensland).

Choerops perpulcher De Vis, 1885: 877, Moreton Bay (Queensland).

Choerodon macleayi Ramsay & Ogliby, 1887a: 241, Port Jackson (New South Wales).

Choerops Hodgkinsonii Saville-Kent, 1893: 296, 370, pl. 15, fig. 2, Port Denison (Queensland).

Diagnosis. Dorsal fin rays XIII, 7, rarely XVI, 6; anal fin rays III, 10; pectoral fin rays ii, 17, rarely 16, dorsalmost ray of moderate length 36.4–53.1% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular; body moderately deep, 37.0–42.2% SL, head depth 27.9–36.8% SL, caudal peduncle depth 12.1–17.8% SL; head blunt, dorsal profile of snout steep, snout length 12.8–18.3% SL; predorsal scales approximately 5 or 6, reaching forward on dorsal midline to above posterior edge of preopercle; cheek with small mostly embedded scales in about 1–5 diagonal rows, posteriormost with about 4 or 5 scales to upper extent of free preopercular edge, variably reaching forward from below eye posteriorly to nearly corner of upper lip crease above mouth, with very broad naked margin posteriorly and ventrally on preopercle; tiny patch of about 1–3 scales in one or two rows on dorsal end of subopercle adjacent preopercular edge; each lateral line scale with multiple branching laterosensory canal tube; scales above lateral line about 3½; cephalic sensory canal

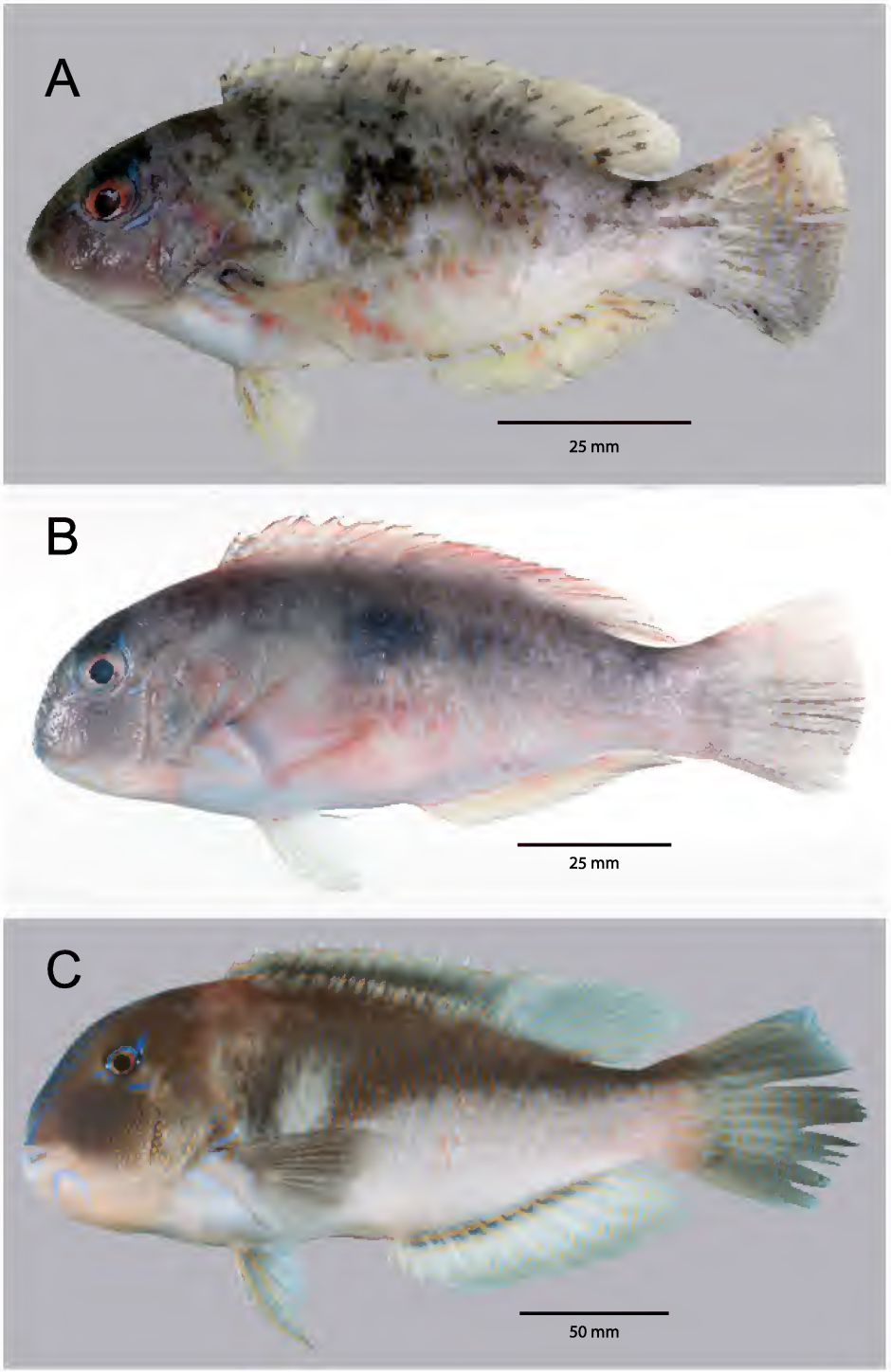

Figure 5. *Choerodon cephalotes*. A, Juvenile, CSIRO H 7676-04, 82 mm SL, Great Barrier Reef, Queensland, Australia, photo by D. Gledhill, CSIRO; B, Initial phase adult, CSIRO H 5958-08, 104 mm SL, Cape Flattery, 14° 48.5' S, 145° 15.4' E, photo by T. Carter, CSIRO; C, Terminal phase adult, 209 mm SL, north-west of Port Hedland, Western Australia, photo compliments CSIRO.

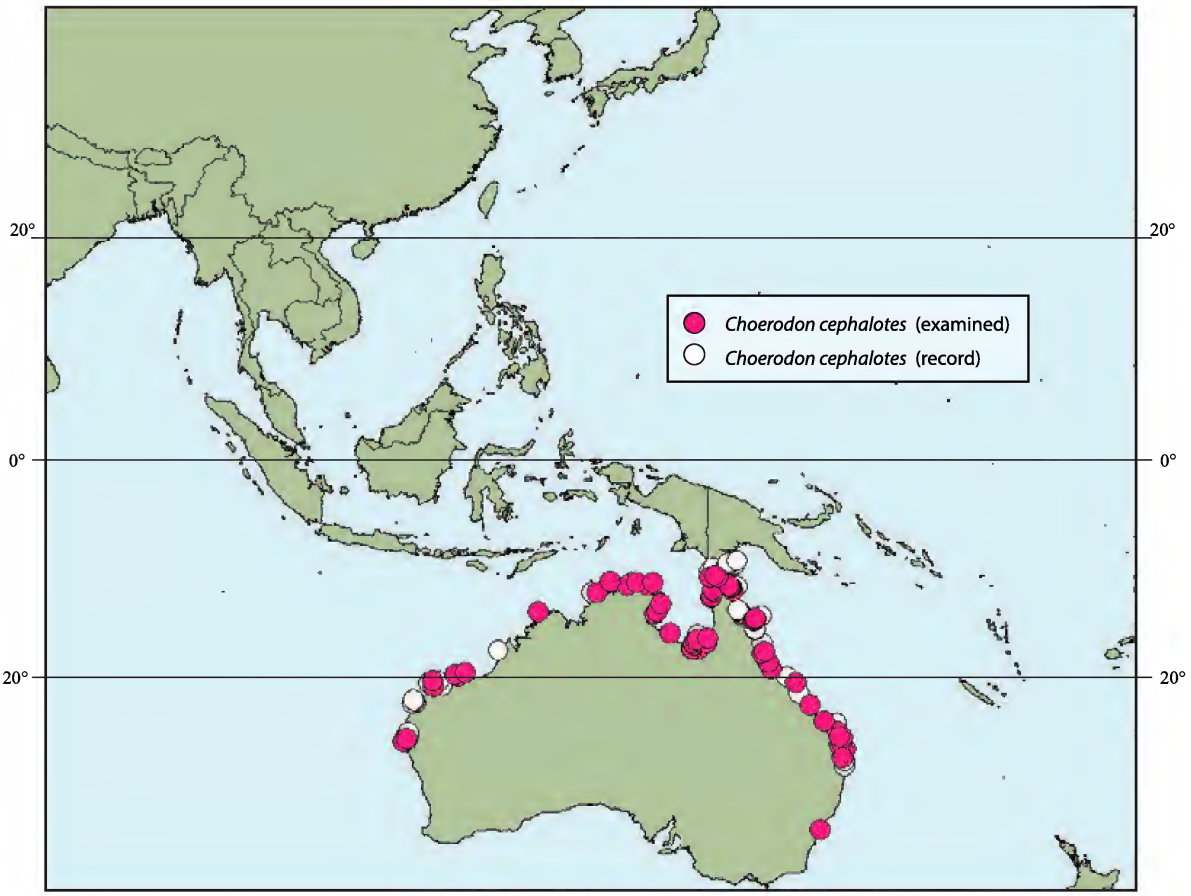

Figure 6. Distribution of *Choerodon cephalotes* based on specimens examined (coloured) and collection registration records (white).

pores extremely numerous especially anteriorly and posteriorly in front of predorsal scales; second pair of canines in lower jaw directed anterodorsally and curved slightly to strongly laterally; dorsal and anal fins with low basal sheath comprising 1–3 progressively smaller accessory scales at deepest; posterior lobe of dorsal and anal fins reaching well past hypural crease in large individuals; caudal fin rounded to broadly pointed centrally; pelvic fin reaching to base of second anal fin ray in large individuals, length 22.0–33.2% SL. (See Table 3 for additional meristic and morphometric ranges.) Adults olivaceous above, creamy white below with horizontal dark patch on upper half of side from below middle dorsal fin spines to dorsal side of caudal peduncle; snout and forehead crossed by 6–8 transverse orange lines.

Reaches moderately large maximum size, largest specimen examined 253 mm SL.

Pigmentation in alcohol. Juveniles pale dusky above with about 7 obscure darker bands dorsally, first broad above eye, second narrower on nape, third below anterior part of dorsal fin, 4th broad with darker anterior and posterior margins below middle dorsal fin spines, 5th broad below first few dorsal fin rays, 6th noticeably darker on top of caudal peduncle and 7th narrow traversing caudal fin base; side ventrally pale; sometimes with midlateral row of about 4 large dusky rectangular blotches on posterior half of body and faint remnants of banding dorsally adjacent to dorsal fin; dark dusky spot dorsally on pectoral fin base and axilla; head with several dusky bands across snout and in front of eye, 6 or 7 slender transverse bands developing above and in front of eye with growth; narrow dusky bands radiating from front of eye towards rear of upper jaw, ventrally from eye behind corner of mouth, and posteriorly from eye towards pectoral fin base; dorsal fin pale with scattered small dusky patches; anal fin pale with small dusky patches basally and fine dusky vermiculations distally; caudal fin pale with narrow dusky bands darkest distally (central part of fin appearing dark when fin not spread); pectoral and pelvic fins pale. Adults dusky above and pale below with posteriorly tapering dark dusky blotch below lateral line from below middle dorsal fin spines variably to below soft dorsal fin rays and in some onto dorsal half of caudal peduncle;

dorsal surface of head dark dusky crossed by up to nine narrow pale lines from about centre of eye gradually slanting anteriorly, last to snout tip; short dusky bar directed dorsoposteriorly from eye and second anteroventrally from eye; curved dusky mark posteroventral to eye; cheeks dusky with fine pale spots, opercle darker with spots ventrally; teeth blue; small dark spot on top of pectoral fin base; dorsal fin pale basally, distal half dusky; anal fin pale with narrow pale stripes distally and posteriorly; caudal fin dusky with numerous narrow pale cross bands; pectoral and pelvic fins pale to slightly dusky.

Fresh colours. Juveniles grey above, white ventrally with obscure broad orange brown stripe above lateral midline on head and body superimposed with broad black to dark brown stripe posteriorly from below middle dorsal fin spines (fig. 5A); head with blue lines as in adults. Dorsal fin of larger juveniles with horizontal rows of blue spots or narrow stripes (Kuiter, 2010: 53, figs A, C & E).

Initial phase adults greenish grey to purple above, white to yellow below; variable horizontally elongate dark brown to black patch on side dorsoposterior to pectoral fin to upper side of caudal peduncle (fig. 5B & C); black line in axial of pectoral fin; body scales edged with blue; snout and forehead blue to violet crossed by 6–8 transverse orange lines; underside of lower jaw white crossed by 3 transverse blue bands; orbit rimmed with blue with broader blue mark directed dorsoposteriorly from eye and short blue horizontal mark posteroventral to eye; numerous fine orange to yellow spots on cheeks and operculum; teeth blue. Alternating blue and orange bands across caudal fin and distally on dorsal and anal fins; pelvic fin green with lengthwise blue lines (Marshall, 1964: colour plate 43, fig. 293; Sainsbury & Kailola, 1984: 257, bottom; Kuiter, 2010: 53, figs B, D, F and G).

Terminal phase adults similar to initial phase but with more vivid colours; blue lines on scales joined to form closely packed fine blue lines crossing sides; horizontal black stripe on side, sometimes extending to caudal fin base; dorsal midline of head and snout intensely blue crossed by numerous orange lines.

Etymology. The name *cephalotes* appears to be a Latinisation of the Greek *kephalotos* meaning "headed", perhaps in reference to the large colourful head of this species.

Distribution. Occurs around the northern coast of Australia from Shark Bay, Western Australia to at least Southport, Queensland, with only the holotype of *C. macleayi* reported to have been collected south of that in Sydney Harbour (fig. 6). Found in areas with rather open rubble or weed bottom at depths of 0.3–80 m, with juveniles sometimes inhabiting algal covered reefs in estuaries (Kuiter, 2010: 53).

Comments. Castelnau's (1875) description of *Choerops cephalotes* generally matches both *C. anchorago* and the species treated here, but the omission of any mention of a prominent white wedge-shaped spot behind the pectoral fin and rectangular blotch on the caudal peduncle characteristic of the former favours its identity as the latter. The type was not found by Bauchot (1963: 22) or Eschmeyer (2015) and is presumed lost. Based on museum collection records, *C. anchorago* appears to be rather uncommon in the Cape York region, whereas this species is abundant at this locality. The colour description of De Vis's (1885) *Choerops perpulcher* is diagnostic for the species treated here and the name is clearly a junior synonym. Two specimens in the Queensland Museum collection are regarded as syntypes of that species (QMB I 945 and QMB I 9920). Although De Vis provided only a maximum size of 14 inches (350 mm) for the species, he does refer to both wet and dry material. QMB I 945 is currently in alcohol but was originally prepared as a dry specimen. It currently has a TL of about 335 mm with a badly frayed tail and may be the basis for the maximum length given by De Vis. As pointed out by Ramsay and Douglas-Ogilby (1857), their *C. macleayi* is a rare example of a species of this genus reaching as far south as the type locality Port Jackson (Sydney Harbour). Of the three species known to occur at this locality, *C. cephalotes*, *C. schoenleinii* and *C. venustus*, the authors' description roughly matches the first two. The extremely high number of branched pectoral fin rays 17 and conversely very few scales on the subopercle identifies it as a junior synonym of *C. cephalotes*. *Choerodon schoenleinii* is the only other member of the genus that regularly has as many as 16 branched pectoral fin rays and similarly greatly reduced subopercular squamation.

Choerodon cephalotes and the very similar *C. cyanodus* have nearly identical distributions and are the most frequently encountered members of the genus in the shallow waters of Australia's northern coast. The series of narrow orange and blue bands crossing the forehead in adults is distinctive for this species.

Material examined. 198 specimens, 29.1–253 mm SL; see appendix.

Choerodon cyanodus (Richardson, 1843)
Blue Tuskfish

Figures 7, 8; table 3; appendix.

Labrus cyanodus Richardson, 1843: 355, Black Point (Port Essington, Northern Territory).

Lachnolaimus arilca Richardson, 1848: 131, Endeavour Straits, Bramble Island (Queensland).

Chaerops crassus Castelnau, 1875: 39, Dampier Archipelago Islands (Western Australia).

Choerops albiqena De Vis, 1885: 876, Cape York (Quensland).

Choerops olivaceus De Vis, 1885: 876, Barrier Reef (Cardwell). CapeYork (Queensland).

Choerops unimaculatus De Vis, 1885: 877, Barrier Reef (Queensland).

Choerodon paynei Whitley, 1945: 29, Dirk Hartog Island, Western Australia.

Diagnosis. Dorsal fin rays XIII, 7; anal fin rays III, 10; pectoral fin rays ii, 14, rarely 12, 13 or 15, dorsalmost ray dorsalmost ray of moderate length 29.9–44.3% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular; body deep, 33.2–47.3% SL, head depth 27.4–41.0% SL, caudal peduncle depth 12.7–16.8% SL; head bluntly pointed, dorsal profile of snout moderately steep, snout length 10.9–18.0% SL; predorsal scales approximately 5–8, reaching forward on dorsal midline to or not quite to above posterior edge of preopercle; cheek with small mostly embedded scales

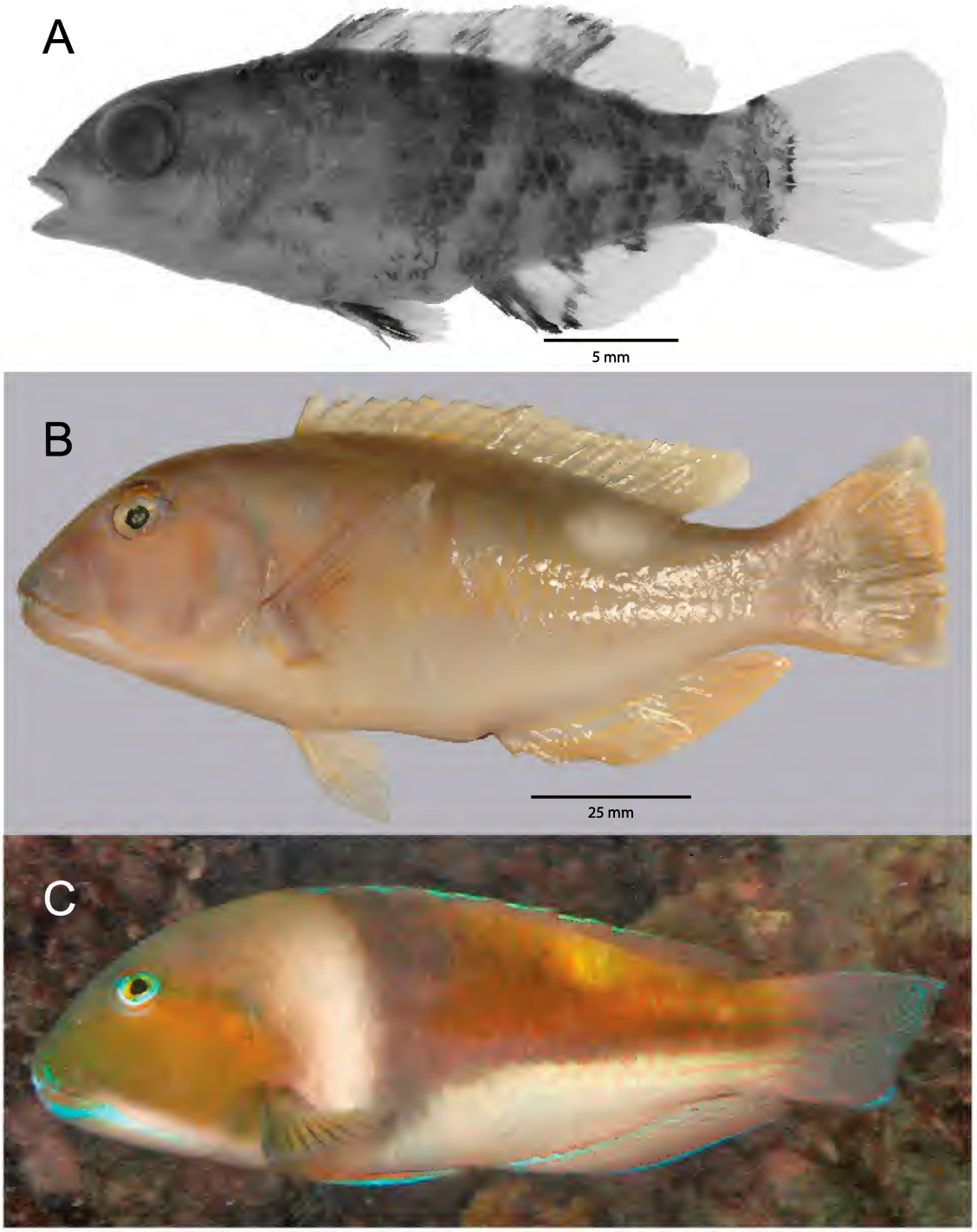

Figure 7. *Choerodon cyanodus*. A, Juvenile, USNM 174385, 26.5 mm SL, Little Lagoon, Groote Eylandt, Northern Territory, Australia (grey scale); B, Initial phase adult, CSIRO H 7673-03, 127 mm SL, Torres Strait, east of Banks Island, Queensland, photo by D. Gledhill, CSIRO; C, Terminal phase adult, Dampier, Western Australia, photo by G. Edgar.

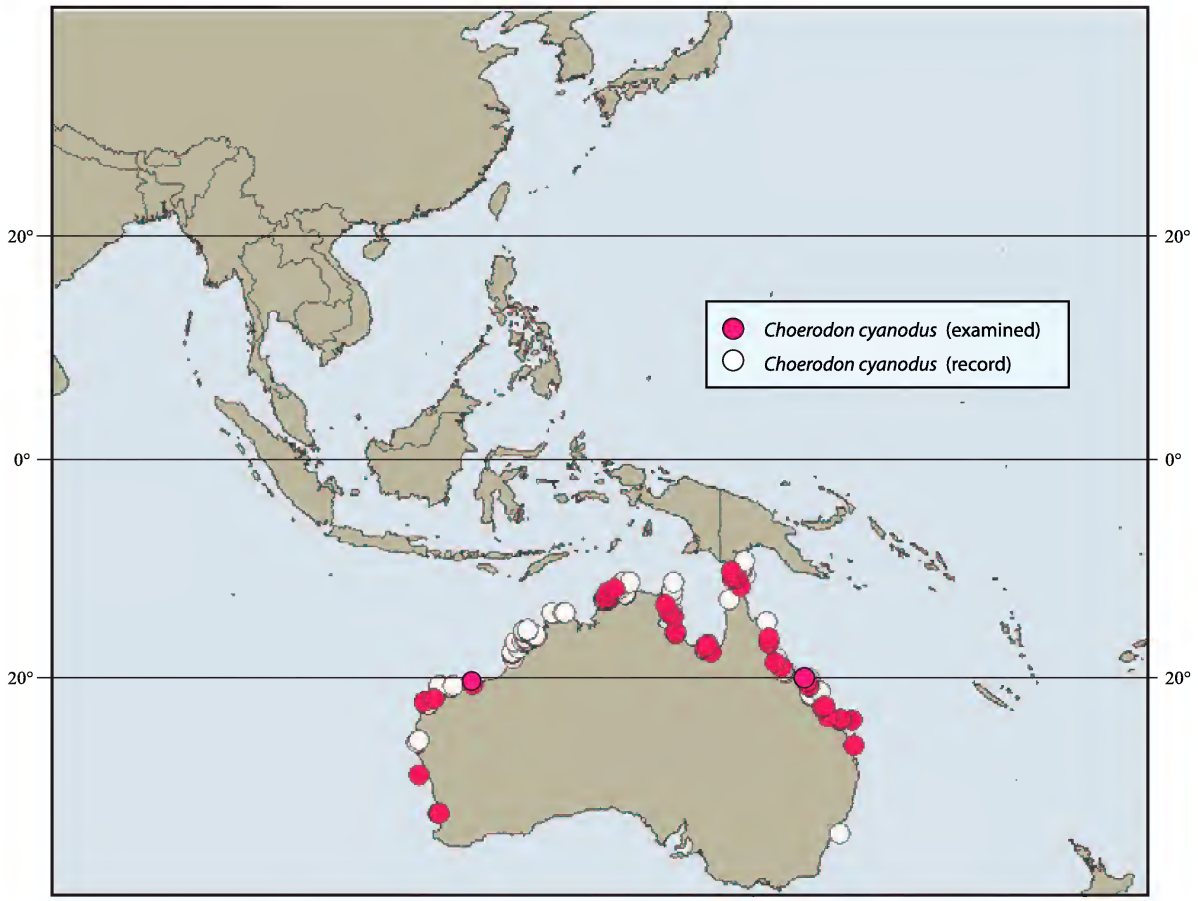

Figure 8. Distribution of *Choerodon cyanodus* based on specimens examined (coloured) and collection registration records (white).

in about 5–7 diagonal rows, posteriormost with about 9 or 10 scales to upper extent of free preopercular edge, reaching forward to or almost to corner of upper lip crease above mouth, with very broad naked margin posteriorly and ventrally on preopercle; about 2 rows of 5–8 small scales (only about 2 scales in second row) on subopercle adjacent preopercular edge extending forward about midway along ventral preopercular margin; each lateral line scale with multiple branching laterosensory canal tube; scales above lateral line about 3; relatively few cephalic sensory canal pores associated with major canals; second pair of canines in lower jaw directed dorsolaterally and curved slightly posteriorly; dorsal and anal fins with very low basal sheath comprising 1–3 progressively smaller accessory scales at deepest; posterior lobe of dorsal and anal fins reaching hypural crease; caudal fin truncate to slightly rounded, upper and lower corners only barely produced at most in large individuals; pelvic fin reaching to base of second anal fin spine in large individuals, length 19.0–24.7% SL. (See Table 3 for additional meristic and morphometric ranges.) Adults green above, white below, usually with white oval patch between bases of first few segmented dorsal fin rays and lateral line, faint broad and slightly darker bands across dorsum; large individuals often with posteriorly tapering dark patch on side from behind pectoral fin to upper half of caudal peduncle.

Reaches moderately large maximum size, largest specimen examined 300 mm SL, but reported to 337 mm SL (AMS I.18219-001).

Pigmentation in alcohol. Juveniles pale with about 8 irregularly angled narrow dusky bands on side; 3 or 4 bands on body continuing onto dorsal fin at least basally, band at bases of last 2 or 3 spines quite dark; about 3 bands also continuing onto anal fin, at least basally; bands on side quickly fading with growth, persisting longest just below dorsal fin base; pelvic fin broadly dark adjacent to leading edge; fins otherwise unpigmented (fig. 7A). Initial phase adults dusky above and pale on underside, especially on lower jaw and ventral side of head, with a large, distinctly pale oval spot dorsally on side between bases of first few segmented dorsal fin rays and lateral line. Dorsal and caudal

fins slightly dusky, posterior corners of caudal fin discrete and slightly darker, faint vermiculations sometimes visible on caudal fin other than corners. Terminal phase adults similar to initial phase but often lacking pale spot between dorsal fin and lateral line and usually with posteriorly tapering pale area on dorsal half of side posterior to pectoral fin base.

Fresh colours. Juveniles greenish yellow, darker dorsally with brown horizontal lines following scale rows and white oval spot as in initial phase adults (Kuiter, 2010: 58, fig. C).

Initial phase individuals green to greenish blue above, yellowish white below (fig. 7B); head deep green with blue bar before eye and blue bars on snout; chalky blue under lips, chin blackish green; teeth blue to blue-green; usually with large bright white oval spot between bases of first few segmented dorsal fin rays and lateral line; 3 short, broad, brownish-olive bands crossing back from just behind dorsal fin origin to middle of dorsal fin base, bands variably faint to dark brown or black depending on locality, pale spot missing from individuals with dark banding; large individuals often with blackish-green stripe from pectoral fin base to caudal fin base; orange to rust coloured rectangular patch behind pectoral fin base with horizontal orange stripes posteriorly. Distal margins of dorsal and anal fins, posterior corners of caudal fin, and leading edges of pectoral and pelvic fins deep to bright blue; red-orange wavy markings on blue background covering remainder of dorsal, anal and caudal fins; remaining pectoral fin rays orange with yellow interradial membranes; pelvic fin with orange submarginal line adjacent to blue margin (Kuiter, 2010: 58, figs A & E).

Terminal phase individuals similar to initial phase with dark blue, brown or black dorsum having vertical anterior margin just behind pectoral fin base reaching ventrally to near level of lower part of pectoral fin base, tapering to lateral midline and continuing to caudal fin base in some (fig. 7C); smaller individuals with horizontal orange lines following scale rows on caudal peduncle; white oval spot more or less obscured in large individuals; dark area frequently replaced by horizontally elongate copper to orange patch (Marshall, 1964: colour pl. 44, fig. 295; Allen, 1985: fig. 327; Kuiter, 2010: 58, figs B, D and F).

Etymology. The name *cyanodus* is from the Greek *kyanos*, "blue" and *odontos* "tooth" in reference to the blue teeth characteristic of this and other species of the genus *Choerodon*.

Distribution. Confined to inshore waters of Australia's tropical north from Shark Bay, Western Australia to Sydney Harbour, New South Wales, recorded in Papua New Guinea at Daru Island in the Torres Strait (fig. 8). Usually found in open algal covered rubble and soft substrate habitats at depths of 0.2–20 m.

Comments. The type of Richardson's (1843) *Labrus cyanodus* is a dry skin (BMNH 1843.6.15.46) prepared from a specimen collected at Black Point, Port Essington, Northern Territory. Although faded, the skin retains the remnants of colour pattern provided in the original account, which is consistent with the above colour description. The name *L. arilca* appears in a description of "Lachnolaimus, *vel* cyanodus" by Richardson (1848), perhaps as an available name should the tentative identification prove to be incorrect. A dried skin in the collection of the British Museum (BMNH 47.6.17.57, 179 mm SL) collected by Richardson and cited by McCulloch (1929–30: 319) under the name *Labrus arilca* is likely to be the type. The description of *C. crassus* by Castelnau (1875) differs markedly from other species in the genus by the numbers of dorsal and anal fin rays, XIII, 12 and III, 13, respectively. Presumably, Castelnau erred in counting branches of posterior rays as individual rays, since an assumed syntype in the Paris collection (MNHN A.8890, 207 mm SL, 256 mm TL) has the typical counts of XIII, 7 and III, 10. As well as being registered from the same collection locality, the specimen has a TL approximating that given by Castelnau of about a foot. The specimen was initially split open, as it would have been if salted as Castelnau implied, and is clearly identifiable as *C. cyanodus*.

De Vis (1885) provided names and descriptions of six new species of *Choerodon* (as *Choerops*) from Queensland waters, four of which have been synonymised with *C. cyanodus*, although one only questionably (Parenti & Randall, 2000: 10). Judging from sizes provided with the descriptions, *C. concolor*, *C. olivaceus* and *C. unimaculatus* are likely to have been based on juveniles, while the size of the type of *C. albigena* was not given. The morphological descriptions of all four are inconclusive for identification, but colour accounts are more helpful. The Queensland Museum has specimens that have been regarded as types of most of these, although the lengths of some do not match those provided by De Vis. The length of a mounted specimen (QMB I.946, 140 mm TL) registered as a syntype of *C. concolor* from north-east Queensland is consistent with the 5½ inches given by De Vis. The specimen is likely to be the type and is identifiable as *C. cyanodus*. Two specimens labelled as "*Choerops unimaculatus* Type?" (QMB I.95, 150 mm TL and QMB unregistered, 134 mm TL) are distinctly longer than the type of that species (4 inches) and therefore not the holotype, but may be others examined as implied in the original description and therefore paratypes in current terminology. De Vis's colour description of *C. concolor* more or less matches the pattern in juveniles of *C. cyanodus*. The only other species occurring on the Great Barrier Reef with a distinctive "bright oval spot below the end of the soft dorsal" in juveniles is *C. schoenleinii*, which has a prominent black spot anterodorsal to it that would certainly have been mentioned by De Vis. *Choerops concolor* is therefore regarded as a synonym of *C. cyanodus*. No specimen was found in the Queensland Museum collection that is conclusively identifiable as the type of *C. olivaceus* from Barrier Reef (Cardwell), Cape York, although the abovementioned specimen registered as QMB I.95 is recorded as coming from that locality. That specimen cannot be the type because it is much longer than the "2 inches" stated by De Vis. The original description of *C. olivaceus* refers to "a pale blotch beneath the posterior half of the dorsal fin", as mentioned above for *C. unimaculatus*, and is likewise considered to be synonym of *C. cyanodus*. Based on the original description of *C. albigena* and a registered type (QMB I.110, 285 mm TL), the name is regarded as another synonym of *C. cyanodus*. Collection details for the type are identical to those provided by De Vis in his description. Still,

the reference to "a dark blotch (sometimes obsolete) on the back beneath the ninth dorsal spine" in that description is difficult to reconcile unless it refers to one of the bands crossing the back of many individuals. These bands are intensely dark in fish occurring in the Kimberley Region of northern Western Australia.

Choerodon cyanodus is geographically variable in both colouration and genetic configuration, but the degree of genetic separation appears to be sufficiently minor as to regard the populations as infraspecific. Different colour forms apparently occur within the same areas, at least in the central western and Kimberley coasts of Western Australian (Fairclough, 2005: 26 and personal communication). Whitley's (1945) *Choerodon paynei* was based on a terminal phase adult form prevalent in the Shark Bay area of Western Australia, which lacks the oval white blotch dorsally on the side below the posterior half of the dorsal fin typical of individuals in northern and eastern Australia. A second form that is well known in the Kimberley Region of Western Australia is marked by prominent broad dark bands on the back that are at the most faint in individuals in north-eastern Australia.

Choerodon cyanodus shares with its close congener *C. cephalotes*, and to a slightly lesser extent *C. schoenleinii*, a particularly high pectoral fin count and few scales on the subopercle, the combination of which are unique for the genus. The species is distinguishable from the two by the sparse sensory pores on the top of the head restricted to the main sensory canals.

Choerodon cyanodus is one of the most abundant tuskfishes in shallow coastal areas of northern Australia having a sand and rubble substrate.

Material examined. 150 specimens, 19.8–300 mm SL; see appendix.

Choerodon graphicus (De Vis, 1885)
Graphic Tuskfish

Figures 9, 10; table 3; appendix.

Choerops graphicus De Vis, 1885: 878, Queensland Coast (Cardwell).

Choerodon transversalis Whitley, 1956: 258, fig. 7, Heron Island, Great Barrier Reef, Queensland.

Diagnosis. Dorsal fin rays XIII, rarely XII, 7; anal fin rays III, 10; pectoral fin rays ii, 14, dorsalmost ray dorsalmost ray of moderate length 35.4–47.9% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular; body deep, 35.3–44.2% SL, head depth 27.4–35.1% SL, caudal peduncle depth 14.5–17.2% SL; head bluntly pointed, dorsal profile of snout moderately steep, snout length 12.2–16.3% SL; predorsal scales approximately 5–7, reaching forward on dorsal midline to above posterior edge of preopercle; cheek with small partially embedded scales in about 7–9 diagonal rows, posteriormost with about 15 scales to upper extent of free preopercular edge, reaching forward almost to corner of upper lip crease above mouth, with very broad naked margin posteriorly and ventrally on preopercle; 1 or 2 rows of about 4–7 small scales (only 1 or 2 scales in second row when present) on subopercle adjacent preopercular edge extending forward to about middle of ventral preopercular margin; each lateral line scale with multiple branching laterosensory canal tube; scales above lateral line about 2½ or 3; numerous cephalic sensory canal pores on top of head behind eye and on cheek anteroventral to eye, fewer between eyes and on snout; second pair of canines in lower jaw directed anterodorsally, very little laterally; dorsal and anal fins with very low basal sheath comprising 1–3 progressively smaller accessory scales at deepest; posterior lobe of dorsal and anal fins reaching beyond hypural crease; caudal fin truncate to slightly rounded, upper and lower corners rounded; pelvic fin reaching to anal fin origin in large individuals, length 21.2–25.5% SL. (See Table 3 for additional meristic and morphometric ranges.) Juveniles and adults olive yellow with broad irregular, angled darker bands on side and broad darker lines radiating from eye; dark spot or blotch on lateral line below middle dorsal fin spines.

Reaches moderately large maximum size, largest specimen examined 368 mm SL, but reported to about 500 mm.

Pigmentation in alcohol. Juveniles pale with 6 broad dusky bands, anterior 2 across nape, subsequent 3 below dorsal fin and last across posterior half of caudal peduncle and base of caudal fin; bands below dorsal fin and on caudal peduncle subdividing to form more numerous narrower dusky bands with broader pale interspaces, areas near middle of several darkened as dark midlateral spots; narrow dusky bands on head radiating from eye, narrow band or pair of bands directed dorsally across top of head, pair of bands directed anterodorsally across snout, band directed anteroventrally across mouth midlaterally traversing underside of lower jaw, band directed ventrally across underside of head behind mouth, and 2 bands directed posteriorly from eye, one towards upper end of pectoral fin base and other towards origin of lateral line; about 4 dusky bands on side extending onto dorsal fin and 3 extending onto anal fin; caudal fin base with small darker spot on dorsal and ventral corners and pair of smaller spots separated by pale space midlaterally; dorsal, anal and caudal fins otherwise pale to transparent; pectoral fin transparent; pelvic fin broadly dusky to dark along leading edges, pale to transparent along posterior edges. Initial phase adults retaining juvenile bands, although those on body more uniformly broad and often fainter and those on head narrower; band directed posteroventrally from eye towards pectoral fin base usually darker; usually with large rather dark spot on lateral line below central dorsal fin spines and second on dorsal profile of side at base of last segmented dorsal fin ray. Terminal phase adults with faint bands on body if at all visible and band directed posteroventrally from eye rather dark.

Fresh colours. Juveniles and initial phase individuals white with 5 or 6 prominent irregular broad brown to black vertical bands from nape to base of caudal fin, band below central dorsal fin spines split vertically, anterior section superimposed with black spot on and below lateral line (fig. 9A & B); bands continuing on head as bars radiating from eye, 3 crossing forehead, 2 directed ventrally and 2 posteriorly, additional vertical bar crossing operculum; dorsal, anal and caudal fins crossed by blue lines or rows of fine blue spots. (Kuiter, 2010: 50, bottom of page figs B and C)

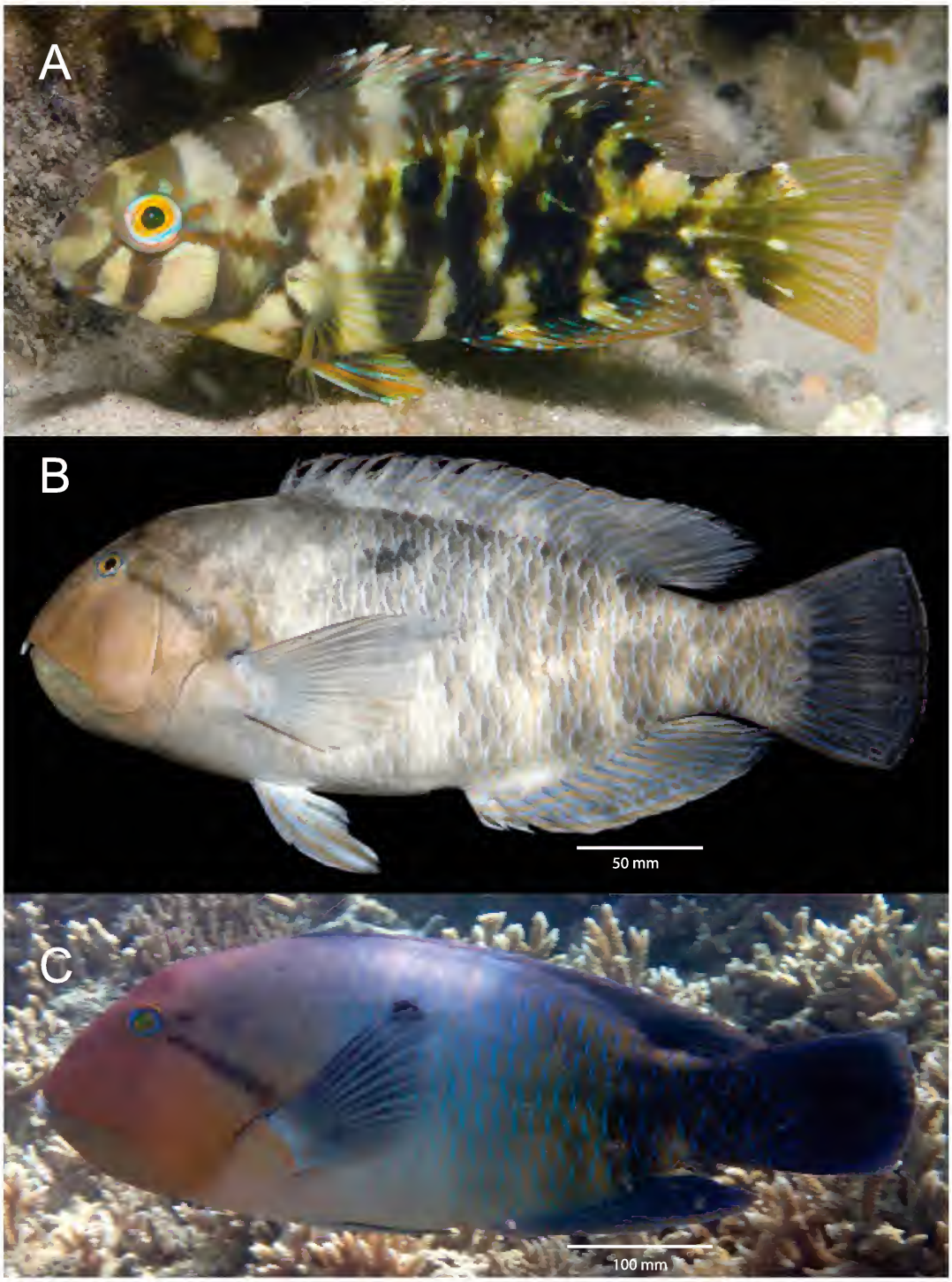

Figure 9. *Choerodon graphicus.* A, Juvenile. Red Rock Estuary, Coffs Harbour, New South Wales, photo by I. Shaw; B, Initial phase adult, BPBM 11413, 287 mm SL, New Caledonia, photo by J. Randall, BPBM; C, Terminal phase adult, approximately 500 mm SL, Ilot Canard, Noumea, New Caledonia, photo by J. Dubosc.

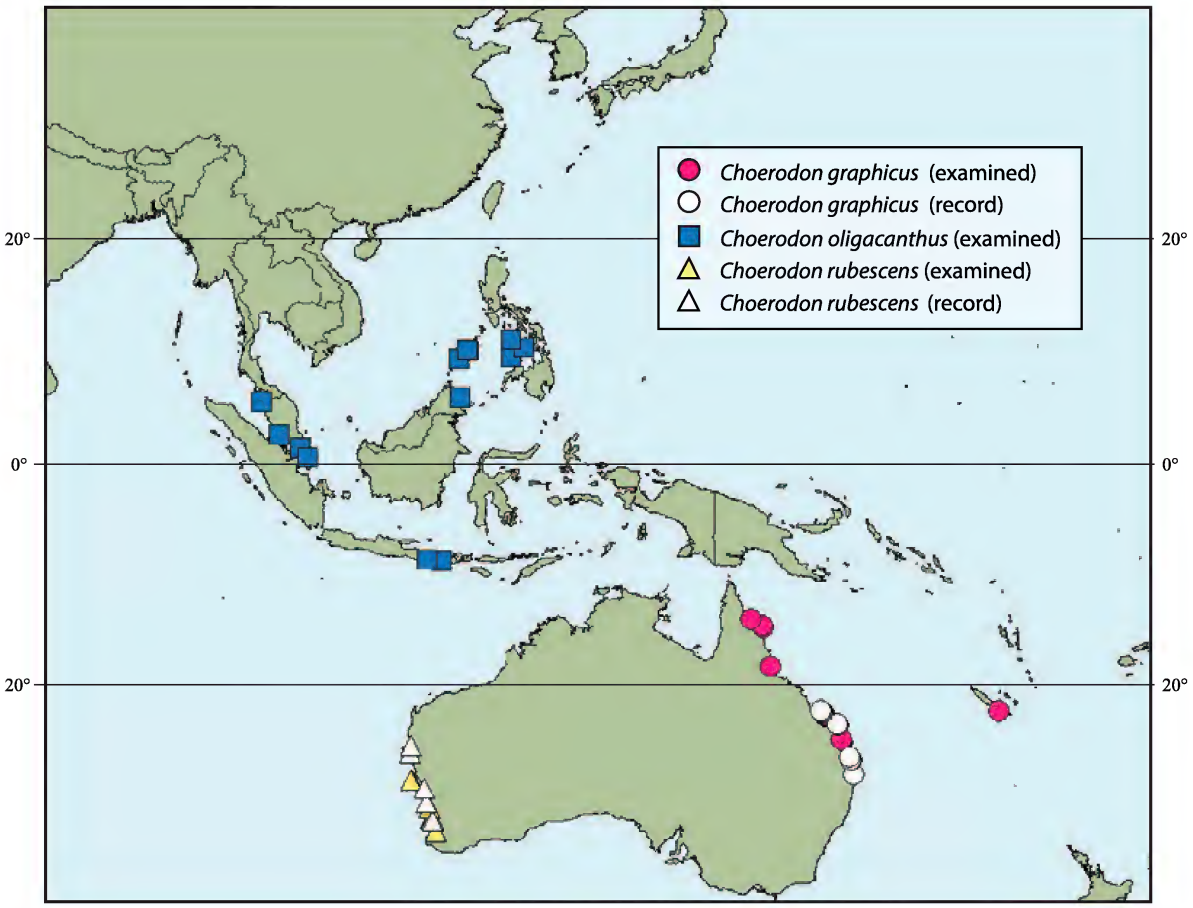

Figure 10. Distributions of *Choerodon graphicus* (circles), *C. oligacanthus* (squares) and *C. rubescens* (triangles) based on specimens examined (coloured) and collection registration records (white).

Terminal phase individuals olive yellow with slate grey to brownish grey anastomosing transverse bands with green flecks, most body scales behind pectoral fin with vertical blue streak (fig. 9C); head dull orange to yellow on cheeks and operculum, chin bright green, bars radiating posteriorly from eye black; fins mostly dark slate grey, dorsal fin with blue margin, reddish orange submarginal line, and scattered blue and orange markings; anal fin blue with numerous fine orange markings; pectoral fin brown, although more grey basally, with green and brown base (Kuiter, 2010: 50, bottom of page fig. A).

Etymology. The name *graphicus* is from the Greek "graphikos", "of writing", perhaps in reference to the complex markings on the side of the head and body resembling letters.

Distribution. A species with limited range restricted to the Queensland coast from Nymph Island off the Cape York Peninsula and south, at least to Southport near the New South Wales border, and New Caledonia (fig. 10). Found on inshore reefs, lagoons and estuaries with open substrate and rubble at depths of 2–36 m.

Comments. De Vis's (1885) brief description of *Choerops graphicus* agrees with the species described above, while a specimen registered as the type (QMB I.944, 360 mm TL) with the same collection information and approximate length given in the original account (14 inches) confirms the identity. Only *C. fasciatus* with XII, 8 dorsal fin rays has a prominent darkly banded colour pattern at this size within the genus. Whitley's (1956) *Choerodon transversalis* is based on a terminal phase specimen (AMS IB.3527, 296 mm SL) collected at Heron Island, Queensland.

The distinctive colouration of this species is unlike that of other species except at a small juvenile size. Individuals of less than about 40 mm SL approach those of *C. anchorago* and *C. azurio* of similar size in overall pattern. *Choerodon graphicus* is separable from the former by pectoral fin count and vertebral formula and from the latter by distance, the two occurring on opposite sides of the tropics.

Material examined. 25 specimens, 13.4–368 mm SL; see appendix.

Choerodon oligacanthus (Bleeker, 1851)
Whitepatch Tuskfish

Figures 10, 11; table 3; appendix.

Crenilabrus oligacanthus Bleeker, 1851: 489, Rio (Riau, Sumatra, Indonesia).

Choerops palawanensis Seale, 1910: 523, Puerto Princessa, Palawan Island (Philippines).

Diagnosis. Dorsal fin rays XIII (rarely XIV), 7; anal fin rays III, 10; pectoral fin rays ii, 14, rarely 15, dorsalmost ray of moderate length 26.1–42.8% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular; body deep, 31.4–39.3% SL, head depth 24.4–33.4% SL, caudal peduncle depth 13.4–14.5% SL; head bluntly pointed, dorsal profile of snout moderately steep, snout length 10.2–16.4% SL; predorsal scales approximately 5–7, reaching forward on dorsal midline to about midpoint between posterior extent of orbit and posterior edge of preopercle, reaching forward to or in advance of posterior edge of orbit more laterally; cheek with small partially embedded scales in about 7–10 diagonal rows, posteriormost with about 13 scales to upper extent of free preopercular edge, reaching forward to corner of upper lip crease above mouth, with relatively broad naked margin posteriorly and ventrally on preopercle; single row of 6 or 7 rather large scales on subopercle adjacent preopercular edge extending forward approaching anterior end of ventral preopercular margin; each lateral line scale with triple branching laterosensory canal tube; scales above lateral line about 3 or 3½; cephalic sensory canal pores moderately numerous to numerous on snout and anteroventral to eye, extremely numerous above and behind eyes; second pair of canines in lower jaw directed anterodorsally and slightly laterally; dorsal and anal fins with very low basal sheath comprising 1–3 progressively smaller accessory scales at deepest; posterior lobe of dorsal and anal fins not quite reaching hypural crease; caudal fin truncate to slightly rounded, upper corners slightly produced in large individuals; pelvic fin not quite reaching anus in juveniles, elongate in large individuals reaching at least to base of 4th segmented anal fin ray, length 22.3–44.6% SL. (See Table 3 for additional meristic and morphometric ranges.) Adults green above, white on underside, usually with large oval white spot pach on lateral line below bases of 6th to 8th dorsal fin spines and black spot below anterior end of oval patch.

Reaches moderately large maximum size, largest specimen examined 250 mm SL.

Pigmentation in alcohol. Juveniles and initial phase adults pale, slightly dusky on dorsum, with dark blotch slightly smaller than eye below lateral line beneath central dorsal fin spines and second spot of similar size or smaller above lateral line anteriorly on caudal peduncle; large elongate pale oval patch developing below middle dorsal fin spines above lateral line in slightly larger individuals posterior to first dark blotch, which progressively extends posteriorly as dark dusky marginal stripe on underside of pale patch; fins pale. Terminal phase adults as in large initial phase adults with posterior dark spot disappearing.

Fresh colours. Juveniles similar to initial phase adults with little red colouration and black spot above lateral line midway along caudal peduncle (White *et al*., 2013: 267, fig. 89.15 juvenile).

Initial phase adults green above, reddish yellow laterally and white on underside, with numerous blue horizontal lines on side and 3 narrow blue bands directed anteroventrally from eye (fig. 11A); black spot below lateral line under 5th to 7th dorsal fin spines; second above lateral line past dorsal fin base; much larger elongate pale spot above lateral line under middle dorsal fin spines. Dorsal fin red; soft portion of dorsal, anal and caudal fins spotted with yellow to pearl; anal fin rays with oblique pearly stripes (Kuiter, 2010: 60, top of page figs A–D).

Terminal phase adults similar to initial phase with more prominent reddish colouration on side and fins (fig. 11B; White *et al*., 2013: 267, fig. 89.15 adult).

Etymology. The name *oligacanthus* is from the Greek *oligo* for "few" and *akantha* for "thorn or spine", in reference to the thirteen dorsal fin spines of this species, which is low for members of the genus *Crenilabrus* as recognised at the time of the description. The generic name has since been referred to a subgenus of the temperate North Atlantic *Symphodus*, which has a high number of dorsal fin spines relative to other members of the Labridae.

Distribution. Confined to the western extreme of the Pacific from the central Philippines and Malaysia to the Java Sea side of southern Indonesia (fig. 10). Found in areas with mud or sand and rubble bottom adjacent coastal reefs, often in turbulent conditions, at depths of 2–15 m (Kuiter, 2010: 60; Allen & Erdmann, 2012: 647).

Comments. The four specimens on which Bleeker (1851) based the description of *Crenilabrus oligacanthus* are in the Rijksmuseum collection (RMNH 6532, 4: 77.0 mm SL, 96.8 mm TL–88.6 mm SL, 110 mm TL) and are consistent with the original account. The largest specimen in the type series is in reasonable condition and should be regarded as lectotype. The jar with this series also contains larger specimens, the longest 209 mm SL. All are considered too large to be potential types. The type of Seale's (1910) *Choerops palawanensis* appears to be no longer extant. The morphological description is not especially diagnostic and the dorsal fin spine count of 14 is assumed to be an individual anomaly, but the colour description mostly matches that of *C. oligacanthus*. It is regarded as a junior synonym of that species.

A relatively common species confined to equatorial waters of the western extreme of the Pacific, *C. oligacanthus* is most easily distinguished from congeners having fourteen segmented pectoral fin rays by the characteristic elongate oval pale spot above the lateral line below the central portion of the dorsal fin and in smaller specimens by the pair of black spots dorsally on the side, the anterior centrered below the sixth dorsal fin spine and the second above the lateral line just posterior to the dorsal fin base. *Choerodon oligacanthus* is the only species of the genus that develops elongate pelvic fins as adults reaching well beyond the anal fin origin.

Material examined. 68 specimens, 50.5–250 mm SL; see appendix.

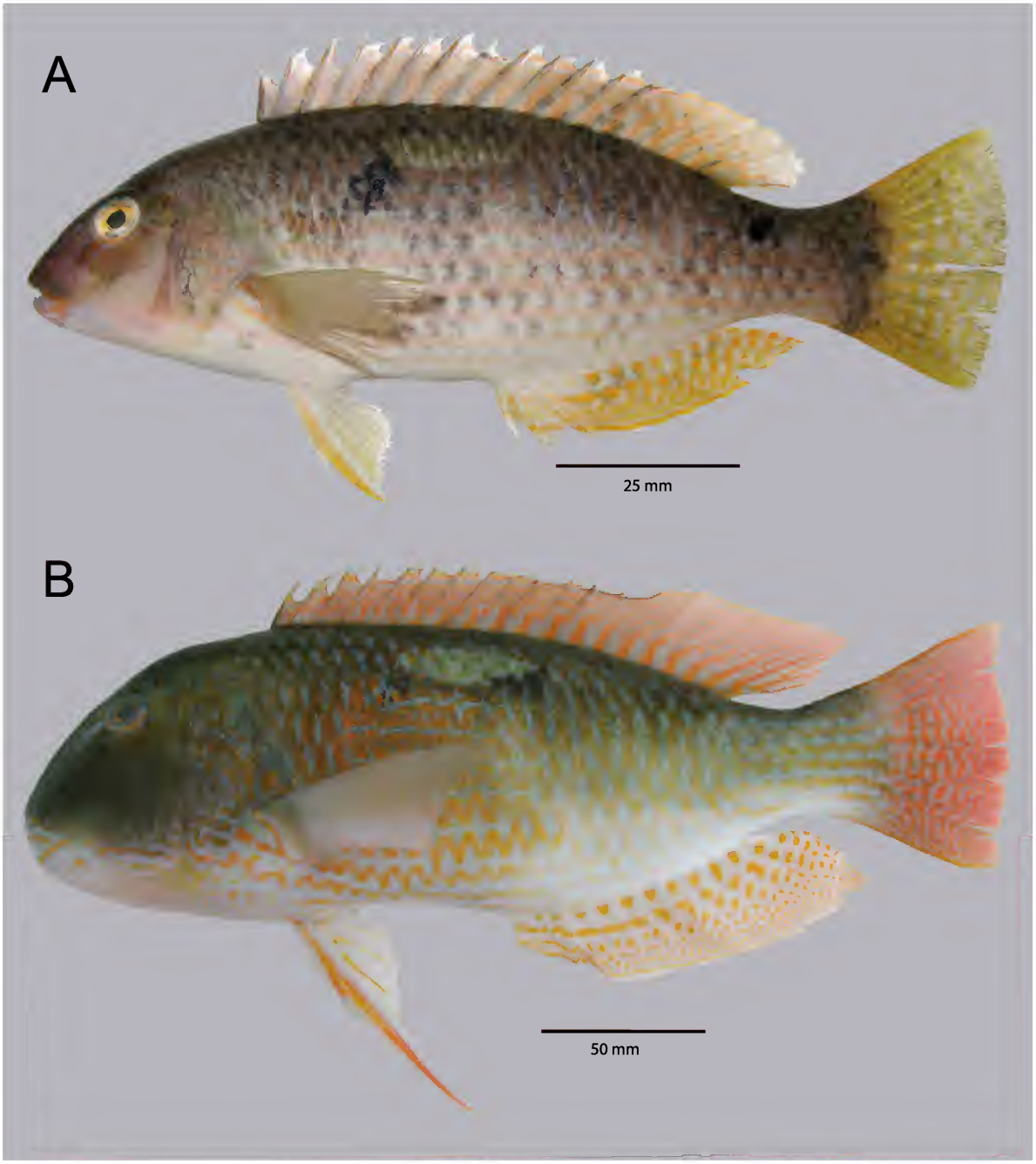

Figure 11. *Choerodon oligacanthus*. A, Juvenile, CSIRO H 7406-07, 107 mm SL, Tanjung Luar, Lombok, Indonesia, photo by W. White, CSIRO; B, Terminal phase adult CSIRO H 7987-01, 229 mm SL, Kedonganan, Bali, Indonesia, photo by W. White, CSIRO.

Choerodon rubescens (Günther, 1862)
Baldchin Groper

Figures 10, 12; table 3; appendix.

Choerops rubescens Günther, 1862: 97, Houtmans Abrolhos (Western Australia).

Diagnosis. Dorsal fin rays XIII, 7; anal fin rays III, 10; pectoral fin rays ii, 16, rarely 15, dorsalmost ray dorsalmost ray of moderate length 26.8–50.3% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular; body deep, 38.1–42.6% SL, head depth 29.8–36.1% SL, caudal peduncle depth 13.4–16.5% SL; head bluntly pointed, dorsal profile of snout steep, snout length 12.3–18.2% SL; predorsal scales approximately 5–8, variably reaching forward on dorsal midline not quite to or in advance of posterior edge of preopercle; cheek with small embedded scales in about 4–6 diagonal rows, posteriormost with about 10 scales to upper extent of free preopercular edge, reaching forward only slightly in advance of preopercular corner, with very broad naked margin posteriorly and ventrally on preopercle; 2 or 3 rows of 3–6 small scales (only 1 or 2 scales in second and third rows when present) on subopercle adjacent preopercular edge extending forward only slightly in advance of preopercular corner; each lateral line scale with multiple branching laterosensory canal tube; scales above lateral line about 4½; cephalic sensory canal pores extremely numerous on top of head and anteroventral to eye, continuing onto cheek; second pair of canines in lower jaw directed mostly dorsally, little laterally; dorsal and anal fins with very low basal sheath comprising 1–3 progressively smaller accessory scales at deepest; posterior lobe of dorsal and anal fins reaching hypural crease, not reaching crease in small individuals; caudal fin truncate to slightly rounded, upper and lower corners rounded, only barely produced at most in large individuals; pelvic fin to just beyond or just short of anus, length 20.1–23.9% SL. (See Table 3 for additional meristic and morphometric ranges.) Adults pink to dark blue with white underside of head below mouth and prominent white spot covering pectoral fin base.

Reaches large maximum size, largest specimen examined 521 mm SL, but reported in the literature to 90 cm (Hutchins & Swainston, 1986: 901).

Pigmentation in alcohol. Juveniles pale dusky, lower half of side and anal fin slightly darker. Adults dusky; underside of head below gape angled posteroventrally to opercular edge stark white; large white blotch covering pectoral fin base. Fins mostly dusky.

Fresh colours. Juveniles yellow to grey, underside of trunk and tail sometimes black (fig. 12A); pectoral fin yellow (Hutchins & Swainston, 1986: fig. 491).

Initial phase adults pink with abruptly white underside of head below level of upper jaw and white oval spot covering pectoral fin base (fig. 12B); fins of similar colour with narrow blue distal margins (Allen, 1985: fig. 328; Kuiter, 2010: 56, bottom of page fig. A; Fairclough, personal communication).

Terminal phase adults similar to initial phase adults but blue to grey overall (fig. 12C; Allen, 1985: fig. 329; Kuiter, 2010: 56, bottom of page fig. C).

Etymology. The name *rubescens* is from the Latin *rubesco* for "reddish", in reference to the reddish ground colour of the type specimen (Kuiter, 2010: 56, bottom of page fig. B).

Distribution. This Western Australian endemic is the most temperate member of the genus on Australia's west coast with the most restricted distribution confined to the region from Shark Bay to Garden Island, south-west of Perth (fig. 10). Smaller individuals occur on shallow sand and inshore reefs, while large adults are usually found on deeper reefs at depths of 4–30 m (Hutchins, 1979: 71; Kuiter, 2010: 56).

Comments. The type of Günther's (1867) *Choerops rubescens* is a dry skin (BMNH 1844.2.15.68, 279 mm SL) with 15 branched pectoral fin rays that matches the original description. Other specimens of this species examined in the course of the study regularly have 16.

This species takes its vernacular name Baldchin Groper from its stark white lower jaw that along with its white pectoral fin base stands out against the uniform, often dark colouration of the remaining head and body.

Material examined. 15 specimens, 54.4–521 mm SL; see appendix.

Choerodon schoenleinii (Valenciennes, 1839)
Blackspot Tuskfish

Figures 13–15; table 3; appendix.

Cossyphus Schoenleinii Valenciennes, in Cuvier & Valenciennes, 1839: 143, Celebes (Indonesia).

Cossyphus cyanostolus Richardson, 1846: 256, Canton (China).

Cossyphus ommopterus Richardson, 1846: 257, Canton (China).

Choerops unimaculatus Cartier, 1874: 102, Cavite (Philippines).

Torresia australis Castelnau, 1875: 36, Cape York (Queensland).

Chaerops notatus Alleyne & Macleay, 1877: 344, pl. XVI, fig. 1, Cape Grenville (Queensland).

Torresia lineata De Vis, 1885: 881, Cardwell (Queensland).

Choerops nyctemblema Jordan & Evermann, 1902: 353, fig. 21, Formosa.

Choerodon rubidus Scott, 1959: 89, fig. 7, Shark Bay (Western Australia).

Diagnosis. Dorsal fin rays XIII, 7; anal fin rays III, 10; pectoral fin rays ii, 16, rarely 17, dorsalmost ray dorsalmost ray of moderate length 41.5–53.9% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular; body deep, 32.8–43.4% SL, head depth 23.7–38.5% SL, caudal peduncle depth 11.8–16.4% SL; head bluntly pointed, dorsal profile of snout moderately steep, snout length 9.0–16.9% SL; predorsal scales approximately 5–7, reaching forward on dorsal midline not quite to or just in advance of posterior edge of preopercle; cheek with moderately large non-imbricate scales in about 5–9 diagonal rows, posteriormost with about 13 scales to upper extent of free preopercular edge, reaching forward to or nearly to corner of upper lip crease above mouth, with moderately broad naked margin posteriorly and ventrally on preopercle; row of 2–5 small scales on subopercle adjacent preopercular edge at or just above preopercular corner; each lateral line scale with multiple

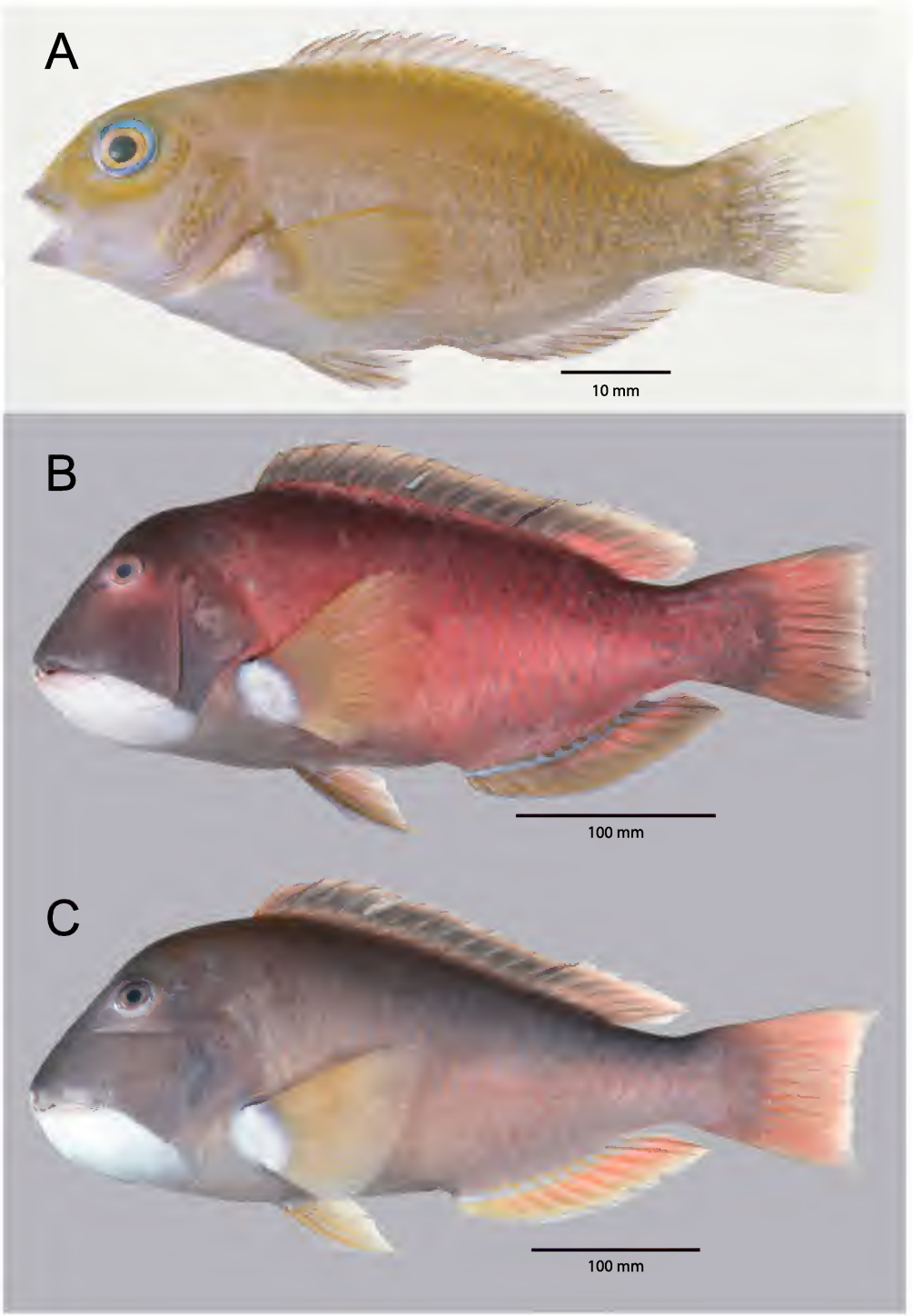

Figure 12. *Choerodon rubescens*. A, Juvenile, WAM P. 27955-018, 60 mm SL, Port Denison, Western Australia, 29° 16' S, 114° 55' E, photo by B. Hutchins, WAM; B, Initial phase adult, CSIRO H 4875-02, 324 mm SL, Western Australia, photo by T. Carter, CSIRO; C, Terminal phase adult, CSIRO H 4875-03, 380 mm SL, Western Australia, photo by T. Carter, CSIRO.

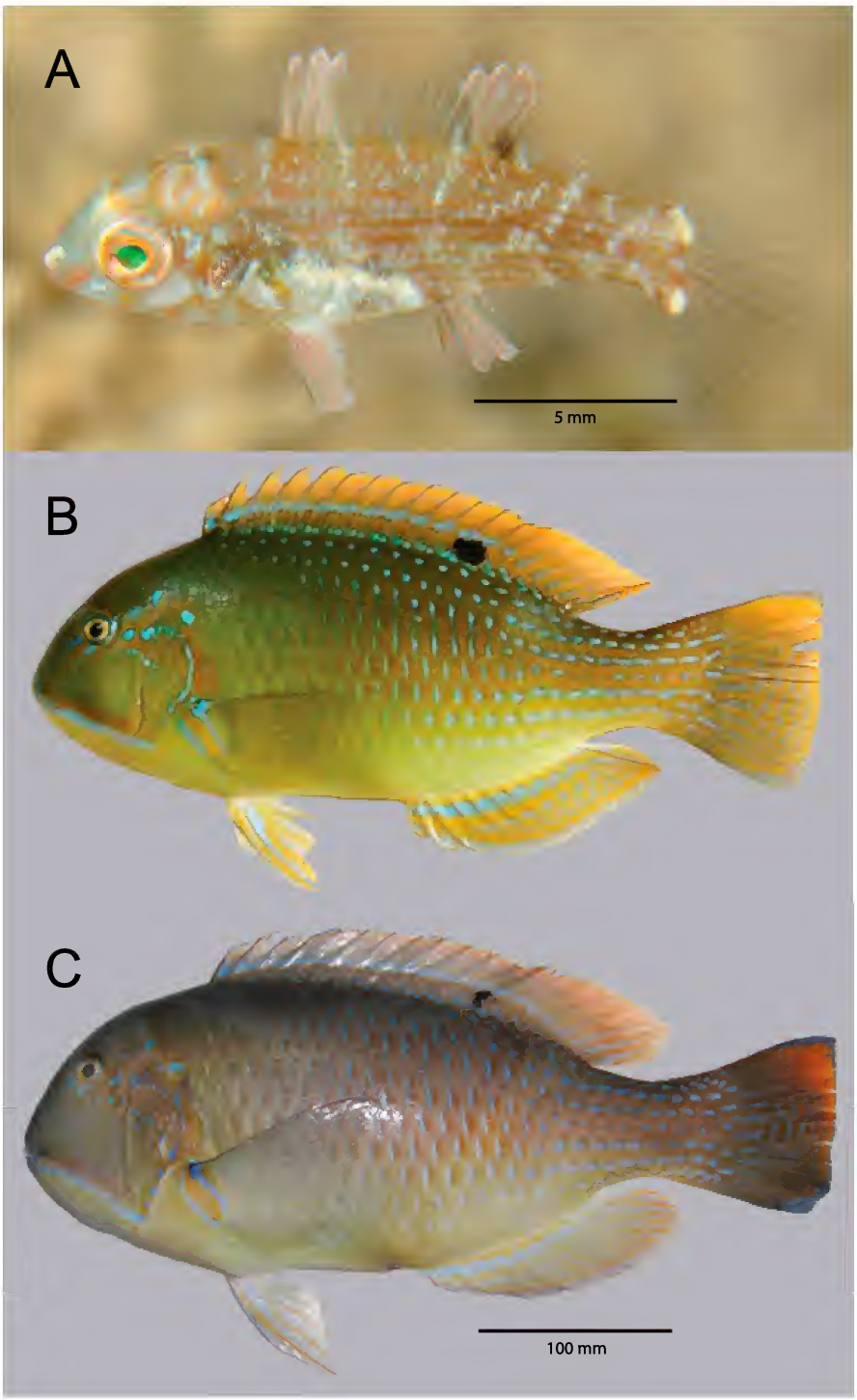

Figure 13. *Choerodon schoenleinii.* A, Juvenile, 15 mm SL, Okinawa-jima Island, Ryukyu Islands, Japan, photo by T. Tsuhako; B, Initial phase adult, Okinawa, Ryukyu Islands, Japan, photo by K. Shimada; C, Terminal phase adult, CSIRO H 7899-03, 320 mm SL, Kedonganan, Bali, Indonesia, photo by W. White, CSIRO.

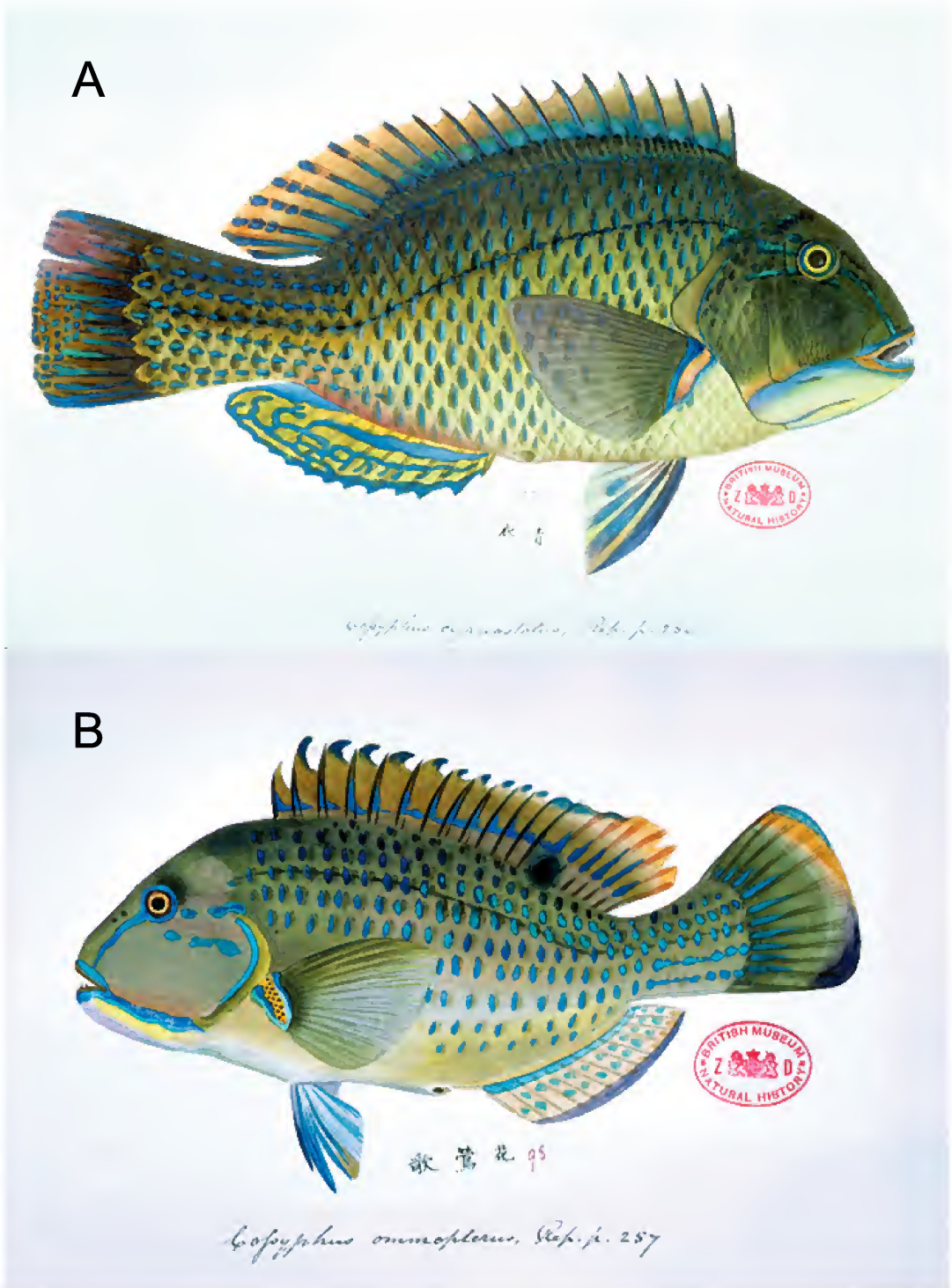

Figure 14. *Choerodon schoenleinii*. A, *Cossyphus cyanostolus* Richardson, 1846, BMNH, terminal phase adult, fourteen inches (280 mm SL), Canton, China Seas; B, *Cossyphus ommopterus* Richardson, 1846, BMNH, initial phase adult, 6¼ inches (124 mm SL), Canton, Sea of China.

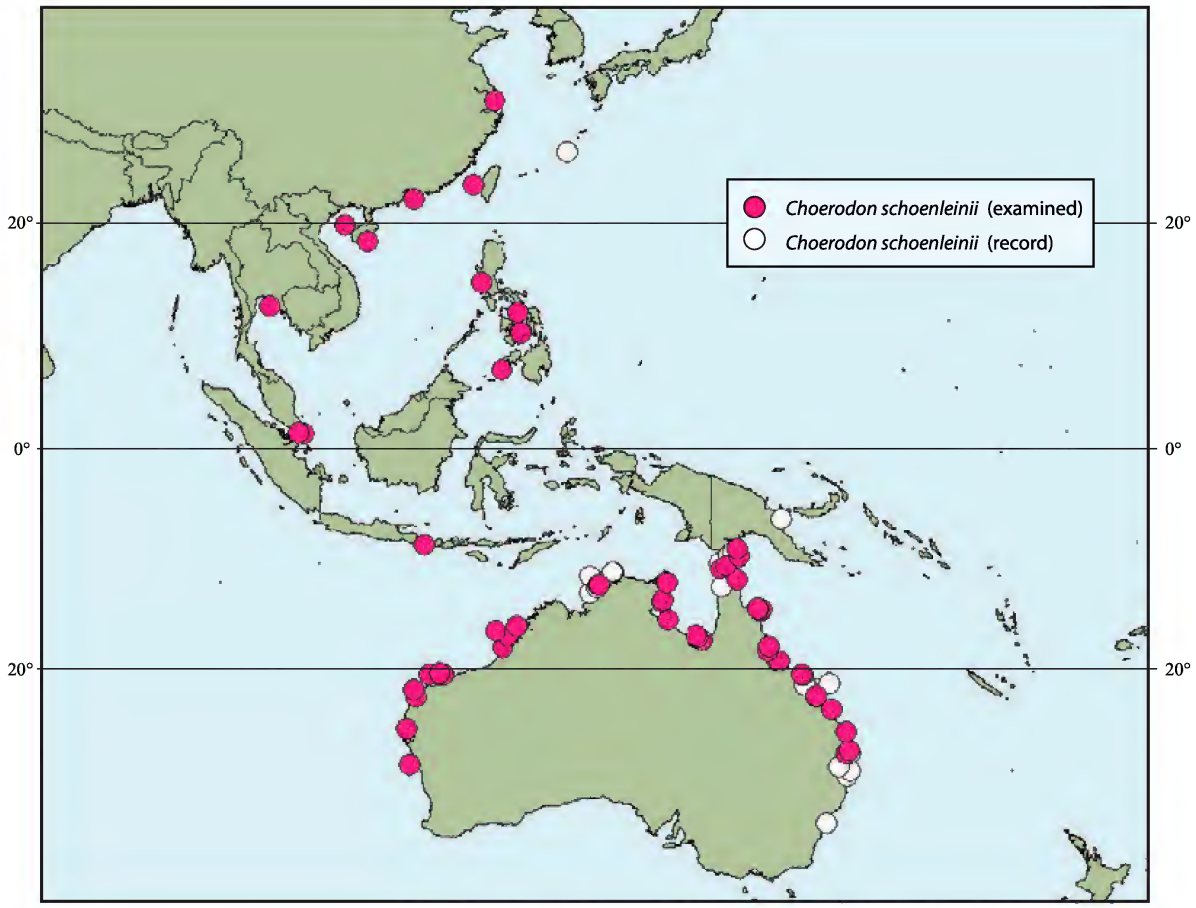

Figure 15. Distribution of *Choerodon schoenleinii* based on specimens examined (coloured) and collection registration records (white).

branched laterosensory canal tube in large individuals; scales above lateral line about 3 or 3½; cephalic sensory canal pores numerous above and behind eyes less so in front of and below eyes; second pair of canines in lower jaw directed anterodorsally, very little laterally; dorsal and anal fins with low basal sheath comprising 1–3 progressively smaller accessory scales at deepest; posterior lobe of dorsal and anal fins not quite reaching hypural crease in juveniles, reaching hypural crease in adults; caudal fin truncate to slightly rounded, upper and lower corners only barely produced at most in large individuals; pelvic fin reaching to base of second anal fin spine in large individuals, length 19.1–27.3% SL. (See Table 3 for additional meristic and morphometric ranges.) Adults bluish green above with yellow sides and vertical blue line of each body scale; black spot on body at base of last dorsal fin spot and white patch often between lateral line and middle segmented dorsal fin rays; head with diagonal blue lines angled from and below eye.

Reaches large maximum size, largest specimen examined 530 mm SL. Reported in the literature to reach 1 m (Kuiter, 2010: 59).

Pigmentation in alcohol. Juveniles pale dusky above, pale below with narrow dusky stripes following horizontal rows of scales especially posteriorly, prominent dark spot on scaly sheath of dorsal fin below last dorsal fin spine; head dusky above and pale ventrally, with 2 dark dusky stripes directed posteriorly from lower half of eye and another 2 from lower half of eye anteroventrally towards upper jaw; fins pale, dorsal and anal with dusky sub-basal stripe, anal with sub-distal stripe; caudal fin pale dusky basally near middle of fin. Initial phase adults pale with duskier dorsum; dark spot on scaly dorsal fin sheath prominent. Terminal phase adults rather dark, scales on side and chest with broad dark margins; lateral line and pectoral fin base dark; caudal peduncle with about 6 horizontal rows of dark spots; dark spot on scaly base of dorsal fin small or absent; fins dusky.

Fresh colours. Juveniles (fig. 13A) tan to pale brown with 8–10 fine white mostly vertical bars dorsally across back, those posteriorly across underside of caudal peduncle as well; head with narrow brown bands directed dosally, anteroventrally and

ventrally from eye; white spot at base of pectoral fin, and dorsally and ventrally on caudal fin base; fins transparent with broad vertical tan patches covering anterior and middle of dorsal fin, pelvic fin and anterior end of anal fin; small dark brown to black spot at base of last dorsal fin spine.

Initial phase adults olive, washed with blue above, often yellow below with vertical blue line on each body scale, those posteriorly merging to form horizontal blue lines (fig. 13B); pairs of blue lines directed anteroventrally and posteriorly from orbit; underside of head orange to yellow, lower jaw blue; teeth blue; blue line at base of pectoral fin; distinctive black spot on body at base of last dorsal fin spine; white blotch often on body below segmented dorsal fin rays in smaller individuals. Dorsal and anal fins with narrow horizontal blue lines; caudal fin with narrow blue bands; pelvic fin with blue leading endge (Masuda *et al.*, 1984: pl. 194, fig. A; Shen, 1993: pl. 144, fig. 6; Okamura & Amaoka, 1997: 465, right second from bottom; Chen *et al.*, 2010: 383, fig. F; Kuiter, 2010: 59, figs B–E; Allen & Erdamann, 2012: 648, top of page; White *et al.*, 2013: 267, fig. 89.17 female).

Terminal phase adults dark bluish green with little if any indication of white spot posteroventral to black spot (fig. 13C); lower jaw and caudal fin rays blue (Masuda *et al.*, 1984: pl. 194, fig. B; Sainsbury & Kailola, 1984: 259, top; Okamura & Amaoka, 1997: 465, centre bottom; Kuiter, 2010: 59, figs A & F; Allen & Erdamann, 2012: 648, centre of page).

Etymology. The origin of the name *schoenleinii* is unclear, although Valenciennes speculated that Agassiz intended it to recognise Johann Lukas Schoenlein, an important medical scientist of the Biedermeier Zeit, following the Napleonic wars, 1815–1858 (Pietsch, Eschmeyer and Fairclough, personal communication).

Distribution. Occurs along the western edge of the Pacific from Okinawa in southern Japan (Nakabo, 2000: 971) and China to both the eastern and western coasts of northern Australia, at least to Shark Bay in Western Australia and Sydney Harbour in New South Wales (fig. 15); not recorded east of the Philippines, Papua New Guinea and eastern Australia. Found on silty or sand to rubble bottoms often with algal cover in lagoons and near coastal reefs at depths of 0.3–46 m.

Comments. Valenciennes (in Cuvier & Valenciennes, 1839: 143) based his description of *Cossyphus Schoenleinii* on a colour figure of a specimen collected in Celebes (Sulawesi, Indonesia) and conveyed to him by Agassiz. Meristic discrepancies involving soft anal fin and pectoral fin ray counts between his description and the species described here are attributed to the inaccuracy of the figure.

Both *Cossyphus cyanostolus* and *Cossyphus ommopterus* were described by Richardson (1846: 256, BMNH 1968.3.11.15, 280 mm SL, and 257, BMNH 1968.3.11.16, 124 mm SL, respectively) from dried specimens collected in Canton (China) with accompanying detailed colour drawings (fig. 14A and B, respectively). They are clearly synonyms of *C. schoenleinii*. Cartier's (1874: 102) description of *Choerops unimaculatus* is based on juveniles as corroborated by the stated lengths of his type series, 3.9–6.7 cm. Although the types appear to have been lost (Eschmeyer, 2015), the colour pattern is that of *C. schoenleinii*. The description of Castelnau's (1875: 36) *Torresia australis* is similarly brief and could apply to more than one species, but the colour account most closely matches that of juvenile *C. schoenleinii*. The disposition of the type is unknown. Morphological details in Alleyne and Macleay's (1877) description of *Chaerops notatus* are inconclusive as to the identity of this species, but the colouration and type (AMS I.16360-001, 216 mm SL) specimen identify it as a synonym of *C. schoenleinii*. De Vis's (1885: 881) description of *Torresia lineata* is also very brief morphologically, but the colour description is clearly that of a juvenile *C. schoenleinii*. The type (QMB I. 11/82, ~80 mm SL) is in poor condition, but is identifiable as *C. schoenleinii* in having 16 branched pectoral fin rays. This is the only species in the Cardwell, Queensland region regularly with that number of pectoral fin rays.

Choerops nyctemblema Jordan & Evermann (1902: 353, fig. 21) was based on a single 18 inch (72 cm) specimen collected in Formosa (Taiwan) that no longer appears to be extant. The description is brief, but of the seven species of *Choerodon* known to occur in Taiwan, it most closely resembles *C. schoenleninii*. The account is consistent with a large example, none of the other six species attaining a length greater than 430 mm SL. Although the authors did not provide a pectoral fin count, the published figure has ii, 16 rays, supporting the identification, with the other six species having 14 (rarely 15) or fewer branched rays. *Choerodon rubidus* described by Scott (1959: 89, a second fig. 7 on that page, labelled *Stethojulis rubromacula* sp. nov.) is based on a 167 mm SL (210 mm TL, SAM F2985) specimen from Point Samson, Western Australia, identifiable as *C. schoenleinii*. Scott gave Shark Bay as the type locality but this appears to be an error, as is the caption for the figure of the species, which is repeated verbatim from the preceding figure. The description also contains a number of contradictions that are likely to have been innaccuracies in data capture, such as the anal fin count of "iii, 11" rather than III, 10, and the pectoral fin count of "17" rather than ii, 16. The type has the latter values typical of *C. schoenleinii*.

As discussed below, Parenti and Randall (2000: 10) synonymised *Choerodon quadrifasciatus* Yu, 1968 with *Choerodon schoenleinii* but that name is considered here to be a synonym of *C. azurio*.

Choerodon schoenleinii is a common species that reaches a relatively large size, explaining its frequency in fish markets throughout the western extreme of the tropical Pacific and consequently its representation in museum collections. The relatively small but prominent black spot on the scaly sheath at the base of the dorsal fin sets it apart from adults of other species, with the possible exception of *C. monostigma*, which has a larger black spot setting higher on the fin and 14 rather than 16 or 17 segmented pectoral fin rays.

Ebisawa *et al.* (1995) studied reproduction and sex change in this species.

Material examined. 113 specimens, 21–530 mm SL; see appendix.

Choerodon venustus (De Vis, 1884)
Venus Tuskfish

Figures 16, 17; table 3; appendix.

Choerops venustus De Vis, 1884: 147, Moreton Bay (Queensland).
Choerodon ambiguus Ogilby, 1910b: 100, 19 miles N 30° W from Double Island Point (Queensland).

Diagnosis. Dorsal fin rays XIII, 7; anal fin rays III, 10; pectoral fin rays ii, 14, dorsalmost ray of moderate length 24.9–46.8% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular; body deep, 36.4–41.5% SL, head depth 26.1–37.2% SL, caudal peduncle depth 12.9–15.0% SL; head bluntly pointed, dorsal profile of snout moderately steep, snout length 11.9–18.6% SL; predorsal scales approximately 4–6, reaching forward on dorsal midline to not quite to above posterior edge of preopercle; cheek with small partially embedded scales in about 5 or 6 diagonal rows, posteriormost with about 10–12 scales to upper extent of free preopercular edge, reaching forward noticeably short of corner of upper lip crease above mouth, with broad naked margin posteriorly and ventrally on preopercle; row of about 8–11 small scales on subopercle adjacent preopercular edge extending forward in advance of middle of ventral preopercular margin; each lateral line scale with multiple branched laterosensory canal tube; scales above lateral line about 3½ or 4; many cephalic sensory canal pores above and behind eyes; second pair of canines in lower jaw directed anterodorsally, very little laterally; dorsal and anal fins with very low basal sheath comprising 1–3 progressively smaller accessory scales at deepest; posterior lobe of dorsal and anal fins not quite reaching hypural crease; caudal fin double emarginate, upper and lower lobes distinctly but not greatly produced, posterior margin of fin concave, smoothly curved; pelvic fin reaching to or just past anus, length 21.3–22.9% SL. (See Table 3 for additional meristic and morphometric ranges.) Adults bluish green above, red laterally and white below, each scale on side with blue dot; juveniles with black spot between lateral line and bases of middle segmented dorsal fin rays.

Reaches moderately large maximum size, largest specimen examined 384 mm SL but reported to at least 430 mm by De Vis (1884).

Pigmentation in alcohol. Juveniles pale with dark spot larger than pupil above lateral line and below second and third soft dorsal fin rays, much smaller spot on dorsal edge of caudal peduncle midway between dorsal fin insertion and hypural crease; dorsal and caudal fins mostly faintly dusky; other fins pale. Adults pale, slightly duskier dorsally with dusky spot on each scale of caudal peduncle, becoming less evident anteriorly; head with pair of dusky marks adjacent to anteroventral margin of eye with additional marks posteroventral to eye and sometimes on snout near upper lip. Fins pale, dorsal and anal fin with row of dusky spots submarginally and second above each base; distal half of caudal fin dusky.

Fresh colours. Juveniles brown above with broad black midlateral smudges and distinct black spot in position occupied by smaller red spot below segmented dorsal fin rays of adults (fig. 16A; Kuiter, 2010: 52, fig. B).

Initial phase adults bluish green above, pale crimson midlaterally and white below; each scale on side with blue spot (fig. 16B); red blotch midlaterally posterior to pectoral fin base and smaller red blotch just above lateral line beneath segmented dorsal fin rays; eye edged with blue, with yellow patch anteriorly, forward directed mark at middle of patch; blue lines along edges of lips, upper followed by yellow line; chin and throat pale blue. Dorsal fin yellow with blue basal and marginal stripes and intermediate row of blue spots; anal fin yellow with broad blue submarginal stripe broken posteriorly and series of blue spots near base; caudal fin greenish yellow with some middle rays blue. Pectoral fin with upper rays and bases of other rays blue; base of fin yellow (Kuiter, 2010: 52, figs. A & C).

Terminal phase individuals with vivid colours and much of side midlaterally dominated by bright pinkish red colouration (fig. 16C; Marshall, 1964: colour pl. 44, fig. 294; Kuiter, 2010: 52, fig. D).

Etymology. The name *venustus* is Latin for "beautiful", no doubt a reference to the attractive colouration of this species.

Distribution. Confined to eastern Australia from the central Great Barrier Reef north of Townsville to off Newcastle, New South Wales (fig. 17). The northernmost verifiable record of distribution is the south-western end of Wardle Reef (17° 27' S, 146° 30' E) based on a photographic image (J. Johnson, personal communication). Occurs in shallow inshore weedy habitats, open substrates with rubble and attached sargassum, ranging into deeper sponge habitats (Kuiter, 2010: 52) at depths of 20–60 m.

Comments. Although De Vis gave the length for his *Choerops venustus* as "to 22 inches" (550 mm), only a single specimen (QMB I.4735, 234 mm SL) in the Queensland Museum collection appears to be a type for this species. This specimen no longer retains the life colours but matches the description morphologically. Ogilby's (1910b) detailed description of *Choerodon ambiguus* likewise matches this species. Only one of two specimens used for the description (AMS I.12535, 134 mm SL) is so identified in the Australian Museum collection, but at least seven others in the collection taken by the Endeavour in the same general area may be some of the 13 trawled at the same time as reported in the description. The second "co-type" is the larger of the two, measuring 181 mm TL (144 mm SL), and is likely to be AMS E.1473 with those lengths.

Taken occasionally along Australia's Queensland coast by commercial trawlers at a marketable size, this attractive species is distinguishable from most other congeners in the area by the concave to forked posterior margin of the caudal fin, which is truncate to rounded in others, apart from *C. vitta* that is recognisable by its more symmetrically pointed head.

Material examined. 56 specimens, 48–384 mm SL; see appendix.

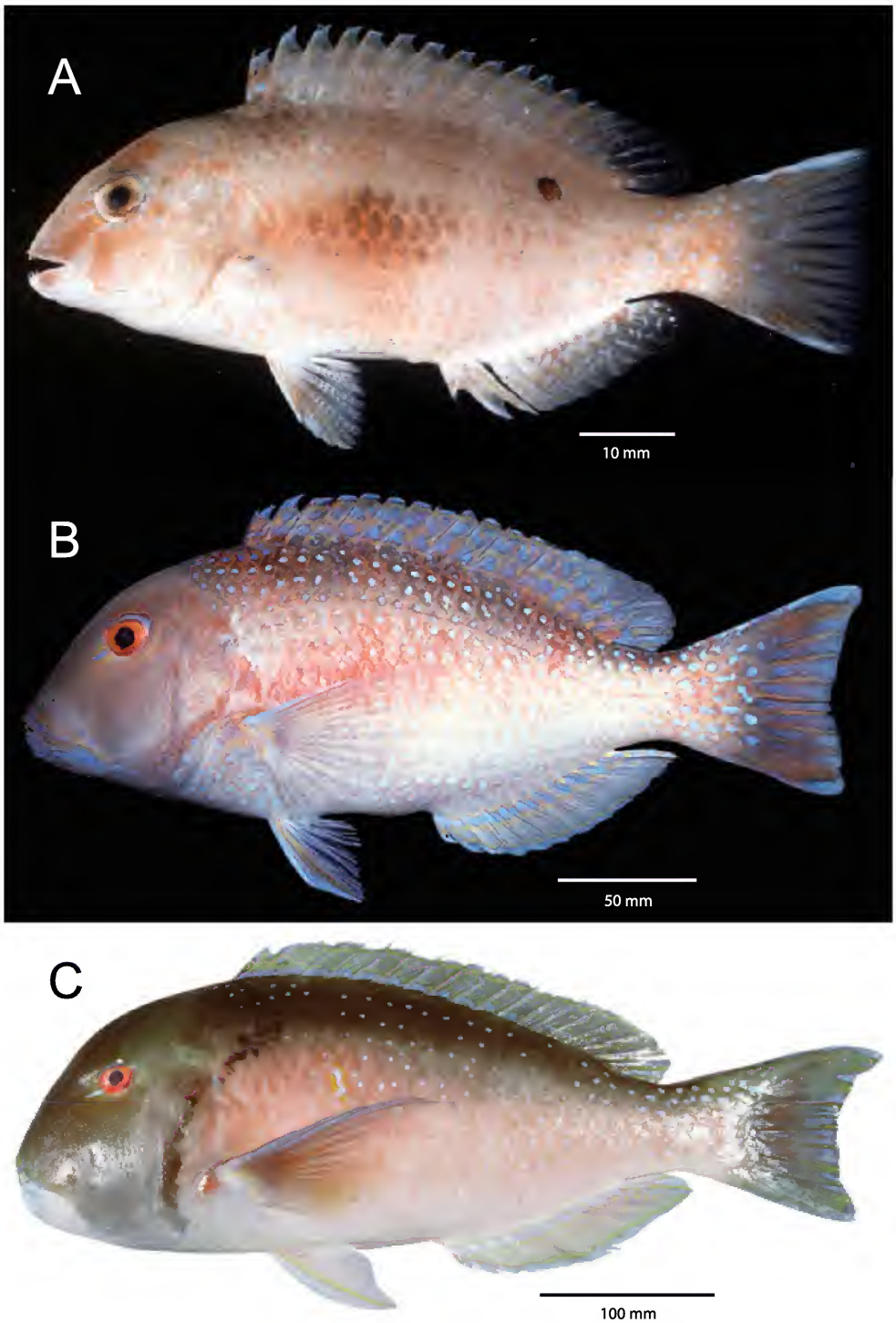

Figure 16. *Choerodon venustus*. A, Juvenile, BPBM 14507, 70 mm SL, One Tree Island, Queensland, Australia, photo by J. Randall, BPBM; B, Initial phase adult BPBM 15972, 241 mm SL, Heron Island, Australia, photo by J. Randall, BPBM; C, Terminal phase adult, CSIRO H 4307-13, 395 mm SL, Queensland, photo by G. Yearsley, CSIRO.

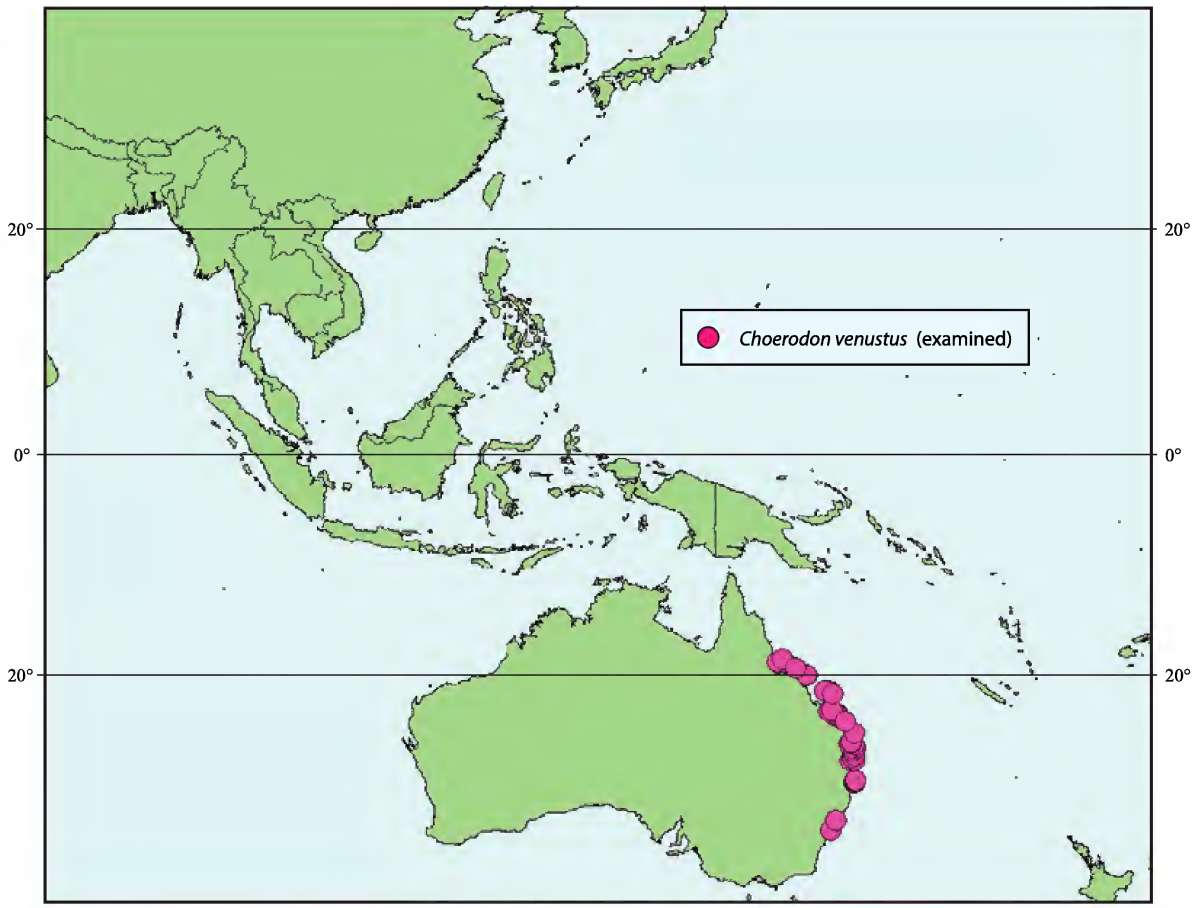

Figure 17. Distribution of *Choerodon venustus* based on specimens examined.

Choerodon (Aspiurochilus) Fowler, 1956

Tables 2 & 4

Lepidaplois (*Aspiurochilus*) Fowler, 1956: 176, type species – *Crenilabrus stejnegeri* Ishikawa (= *C. azurio*) by monotypy.

Diagnosis. Dorsal fin rays XII, 8 or XIII, 7, rarely XI, 9; anal fin rays III, 10; pectoral fin rays ii, 14, rarely 15, dorsalmost ray of moderate length 23.9–45.2% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular to broadly rounded; body moderately deep, 34.8–45.9% SL, head depth 26.6–42.2% SL, caudal peduncle depth 12.2–16.8% SL; head blunt, dorsal profile of snout moderately steep to steep, snout length 9.9–16.7% SL; predorsal scales approximately 5–11, reaching forward on dorsal midline to or just in advance of posterior edge of preopercle, to above middle of eye or to somewhere between; cheek with small imbricate to mostly embedded scales in about 4–9 diagonal rows, posteriormost with about 9–17 scales to upper extent of free preopercular edge, reaching forward to or almost to corner of upper lip crease above mouth, with broad naked margin posteriorly and ventrally on preopercle; 1–4 rows (only about 2 scales in second row when present) of small scales on subopercle adjacent preopercular edge extending forward to or just short of anterior end of ventral preopercular margin, with about 6–11 scales in outermost row; each lateral line scale with unbranched to multiple branching laterosensory canal tube; scales above lateral line about 2½ or 3; cephalic sensory canal pores relatively few to moderately numerous confined to lines or short branches associated with major canals; second pair of canines in lower jaw directed anterodorsally and slightly laterally, often strongly curved laterally; dorsal and anal fins with low to very low basal sheath comprising 1–3 progressively smaller accessory scales at deepest; posterior lobe of dorsal and anal fins reaching at most to base of first anal spine, usually to or just short of hypural crease; caudal fin truncate to distinctly rounded or with concave posterior profile. (See Table 2 for additional meristic and morphometric ranges.) Bicolour pattern in adults of 3 of 5 species, dusky anteriorly and paler

posteriorly, contrasting areas separated by diagonal interface.

Reaches moderately large size, ranging in maximum lengths of from about 225 to more than 430 mm SL.

Comments. Fowler (1956: 176) incorrectly referred Ishikawa's (1904) *Crenilabrus stejnegeri* to *Lepidaplois* (= *Bodianus*), separating it from the other five species he recognised as occurring in Chinese waters by a suite of characters, some of which conflicted with his diagnosis for that genus. The same characters were considered a justification for placing it in a new subgenus *Aspiurochilus*. Although clearly not a group name for an assemblage of *Bodianus*, the name is available for species within *Choerodon* to which *C. stenjegeri* (= *C. azurio*) belongs. The subgenus comprises five species, one of which is described here as new. Species of this subgenus (fig. 1, clade 2) are most similar to those of the subgenus *Choerodon* (fig. 1, clade 3) in having a rather deep body without characteristic modifications, some differing from members of that assemblage in having XII, 8 rather than XIII, 7 dorsal fin elements and all retaining 14 branched, segmented rays in the pectoral fin as well as scales on the subopercle reaching to or almost to the anterior extent of the ventral subopercular margin. Five of the nine species of the subgenus *Choerodon* typically have 13 or 15–17 branched rays in the pectoral fin and only two of the nine species have scales on the subopercle reaching in advance of the midpoint between the corner of the preopercle and the anterior extent of the ventral subopercular margin, with several considerably more reduced. Most reach a moderate size exceeding 250 mm SL, although one, *C. monostigma*, has only been verifiably recorded to about 160 mm SL.

Choerodon azurio (Jordan & Snyder, 1901)
Azurio Tuskfish

Figures 18, 19; table 4; appendix.

Labrus japonicus Valenciennes, in Cuvier & Valenciennes, 1839: 99, Japan.

Choerops azurio Jordan & Snyder, 1901: 747, a replacement name for *Labrus japonicus*, Valenciennes, a junior homonym of *Labrus japonicus* Houttuyn (1782).

Crenilabrus stejnegeri Ishikawa, 1904: 13, pl. VI, fig. 2, Miyakojima (Japan).

Choerodon quadrifasciatus Yu, 1968: 11, fig, 5, Tongkong (Taiwan).

Diagnosis. Dorsal fin rays XIII, 7; anal fin rays III, 10, rarely 9; pectoral fin rays ii, 14, rarely 15, dorsalmost ray dorsalmost ray of moderate length 29.3–41.4% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular; body deep, 34.8–45.9% SL, head depth 26.6–42.2% SL, caudal peduncle depth 14.7–16.8% SL; head blunt, dorsal profile of snout steep, snout length 10.2–15.5% SL; predorsal scales approximately 5–7, reaching forward on dorsal midline to about midpoint between posterior extent of orbit and posterior edge of preopercle; cheek with small imbricate to partially embedded scales in about 8 diagonal rows, posteriormost with about 10 scales to upper extent of free preopercular edge, reaching forward to or almost to corner of upper lip crease above mouth, with very broad naked margin posteriorly and ventrally on preopercle; row of about 9 or 10 small scales on subopercle adjacent preopercular edge extending forward to about anterior end of ventral preopercular margin, about 3 rows dorsally; each lateral line scale with mutlple branching laterosensory canal tube; scales above lateral line about 2½; cephalic sensory canal pores relatively few confined to lines or short branches associated with major canals, more numerous above eyes; second pair of canines in lower jaw directed anterodorsally and slightly laterally, curved posterolaterally; dorsal and anal fins with low basal sheath comprising 1–3 progressively smaller accessory scales at deepest; posterior lobe of dorsal and anal fins reaching to of just short of hypural crease; caudal fin truncate to slightly rounded; pelvic fin length reaching to or just short of anus, length 17.8–23.6% SL. (See Table 4 for additional meristic and morphometric ranges.) Adults with broad dark oblique band angled from pectoral fin base towards centre of dorsal fin base with broad pale band bordering it posteriorly.

Reaches moderately large maximum size, largest specimen examined 308 mm SL.

Pigmentation in alcohol. Juveniles dark dusky with 6 or 7 somewhat obscure narrow pale vertical bands crossing side from above and behind eye to caudal fin base, anterior 2 crossing nape and merging with pale underside of head with broad dusky bands directed ventrally from eye and adjacent posterior margin of operculum; dusky band-like interspaces on sides extending onto dorsal fin near anterior, central and posterior spines and onto front, middle and posterior end of anal fin, with prominent ocellated dark spot posteriorly on dorsal fin and at middle of anal fin, with smaller dark spots at front of dorsal fin and basally on pelvic fin; caudal fin and posterior ends of dorsal and anal fins transparent. Initial phase with pale head and dusky dorsum anterior to darker oblique band angled from base of pectoral fin towards bases of spines at centre of dorsal fin, followed by broad pale band and pale dusky area posteriorly; scales posteriorly on side with dusky vertical bar to spot in large individuals; spinous portion of dorsal fin dusky with darker blotch covering last spine or two, pale posteriorly; anal fin pale with dusky blotches; caudal fin dusky; pectoral and pelvic fins pale. Terminal phase similar to initial phase but duskier overall. Juveniles dusky with darker mottling; dark dusky blotch at anterior ends of dorsal and anal fins, prominent pale-edged dark spot on dorsal fin centred on first few rays and dusky blotches basally on anal fin posteriorly; pelvic fin pale with dusky blotch basally.

Fresh colours. Juveniles olive brown to brown with 5 narrow white bands, first 2 crossing predorsal, 3rd below 4th or 5th dorsal fin spines, 4th below last couple of dorsal fin spines and 5th at posterior end of dorsal fin base (fig. 18A); 2 narrow broken black stripes on and above lateral line; head brown dorsally and white ventrally with brown band from eye to tip of snout and second below eye. Dorsal, anal and pelvic fins same colour as side adjacent with continuation of white bands on side; white ocellated large black spot near middle of segmented ray portion of dorsal and anal fins and less defined ocelli dorsally and ventrally on caudal fin base, caudal and pectoral fins hyaline (Masuda *et al*., 1984: pl. 193, fig. C; Okamura &

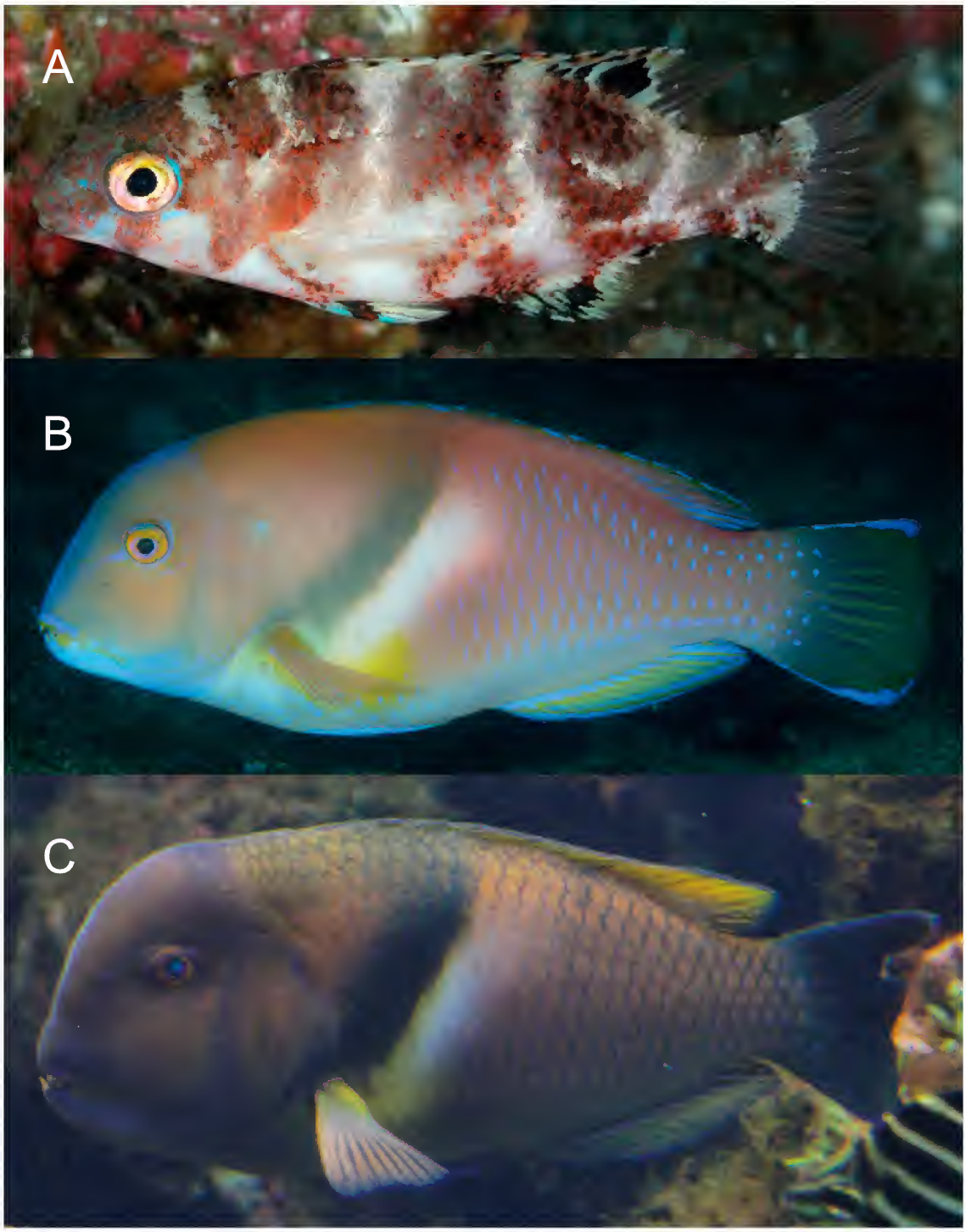

Figure 18. *Choerodon azurio*. A, Juvenile, approximately 40 mm SL, Osezaki, Numazu, Shizuoka, Japan, photo by Izuzuki; B, Initial phase adult, approximately 220 mm SL, Osezaki, Numazu, Shizuoka, Japan, photo by Izuzuki; C, Terminal phase adult, photo by K. Berlin, Creative Commons Attribution Share Alike 2.0 Generic.

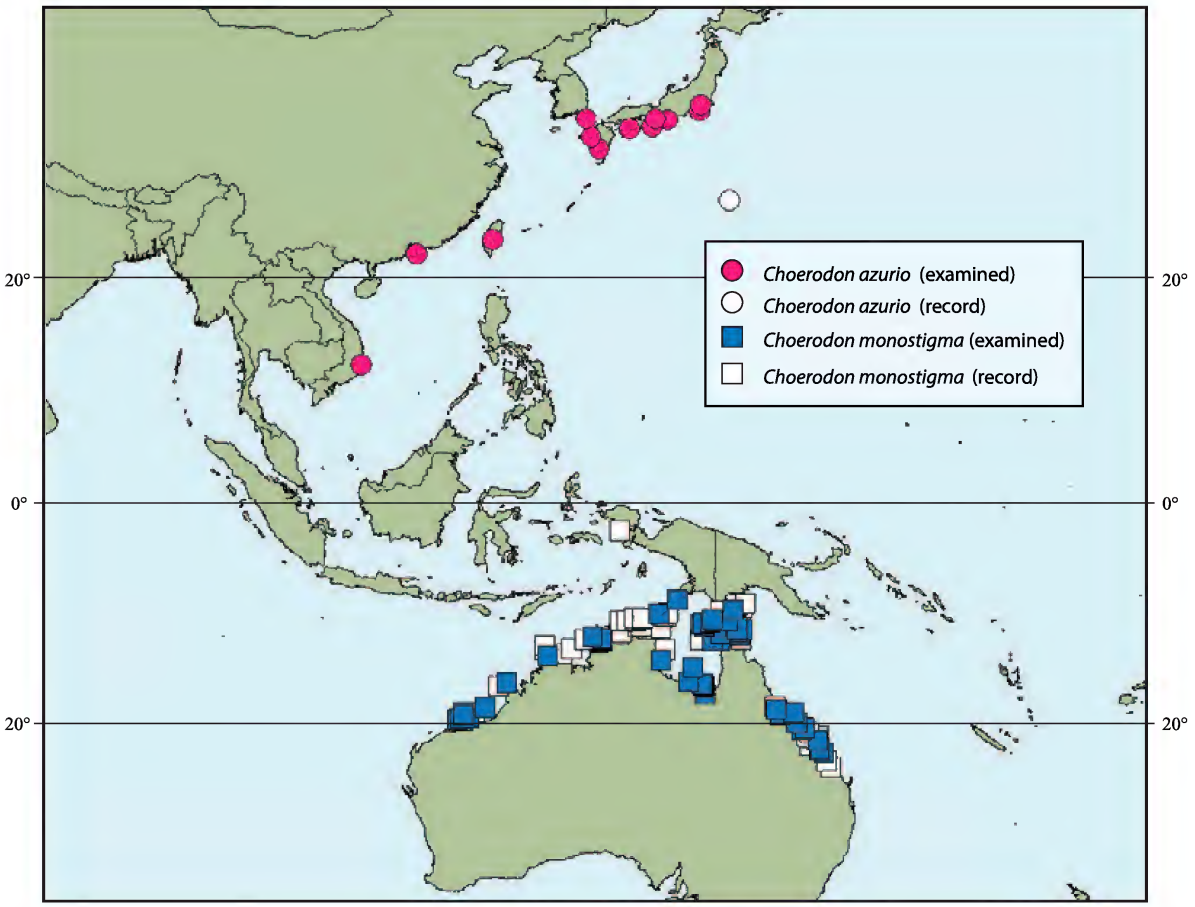

Figure 19. Distributions of *Choerodon azurio* (circles) and *C. monostigma* (squares) based on specimens examined (coloured) and collection registration records (white).

Amaoka, 1997: 465, centre second from top and right top; Kuiter 2010: 55, fig. A).

Initial phase adults pinkish brown with white underside and blue bar on each body scale (fig. 18B); prominent oblique transverse dull olive green band from axilla of pectoral fin to bases of 8th and 9th dorsal fin spines, immediately adjacent posteriorly to broad pink or white band; head with 3 short blue lines directed anteriorly, ventralmost longest and directed slightly downward; 4th blue line oriented horizontally below posterior half of eye. Dorsal and anal fins brown with narrow blue distal margins; caudal fin brown with narrow blue dorsal and ventral margins, broadest at posterior corners. Pectoral fin hyaline; pelvic fin with pair of blue lengthwise lines separated by yellow line along leading edge. (Shen, 1993: pl. 144, fig. 1; Okamura & Amaoka, 1997: 465, centre top; Chen *et al.*, 2010: 384, fig. A; Kuiter, 2010: 55, fig. C; Allen & Erdmann, 2012: 645)

Terminal phase with blue hue dorsally and ventrally on head and yellow to orange patch posterior to pectoral fin base (fig. 18C); dark transverse band on side black. Anal fin yellow basally; caudal fin nearly black (Masuda *et al.*, 1984: pl. 193, fig. D; Okamura & Amaoka, 1997: 465, left top; Kuiter, 2010: 55, figs B & D).

Etymology. The name *azurio* is likely to be from the French *azur* or Pershian *lazhuward* for "a blue colour", in reference to the blue colouration featuring on adults of this species.

Distribution. Confined to the north-western edge of the North Pacific (fig. 19) from Tokyo, Japan and the Korean Peninsula to at least Nho Trang, Vietnam, eastward to the Ogasawara Islands in the north (Randall *et al.*, 1997: 45). Occurs on open bottom near the edges of deep rocky reefs to depths of 20 or 30 m, with juveniles secluded in rocky outgroups or under ledges on rocky walls (Kuiter, 2010: 55; Allen & Erdmann, 2012: 645).

Comments. *Labrus japonicus* proposed by Valenciennes (in Cuvier & Valenciennes, 1839) for a species occurring in Japanese waters based on a specimen in the Berlin Museum, presented by M. Langsdorff is a junior homonym of *Labrus japonicus*

Houttuyn, 1782 (= *Pseudolabrus japonicus*) and therefore unavailable. Jordan and Snyder (1901) recognised the problem and provided *Choerops azurio* as a replacement for the name, incorrectly attributed to Schlegel, without further comment.

Ishikawa's (1904: 13, pl. VI, fig. 2) *Crenilabrus stejnegeri* was based on a juvenile (80 mm TL) of *C. azurio* with a developing adult colouration. The type is evidently no longer extant (Eschmeyer, 2015). Parenti and Randall (2000: 10) synonymised *Choerodon quadrifasciatus* Yu, 1968 with *Choerodon schoenleinii,* citing Gomon (personal communication) as authority. Based on Yu's description, this referal is contradicted by his pectoral fin count of "2, 14", in contrast to ii, 16, the usual number in *C. schoenleinii*. The types were not found at the Pisces Collection of the National Museum of Marine Biology and Aquarium, Pintung, Taiwan , the current repository for most of Yu's specimens, and despite Eschmeyer's (2015) listing, may not have been transferred there (Ho, personal communication). The original description more closely matches *C. anchorago* (based on anal fin value) and *C. azurio* (based on pectoral fin value). The type specimen was clearly a juvenile, and judging from the figure (Yu, 1968: 11, fig. 5) more closely matches juveniles of *C. azurio* at the approximate size of the type. In either case, the name is a junior synonym.

This is the most frequently encountered member of the genus in the coastal waters of Japan and China, easily recognised by its steep, black and white white oblique band angled upward on its rather deep body from behind the pectoral fin base. Others in the region with an oblique dark band on the side are either much more slender or have twelve spines and eight segmented rays in the dorsal fin.

Material examined. 40 specimens, 24.1–308 mm SL; see appendix.

Choerodon cypselurus sp. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:AC4D29C3-820C-4582-A19E-56BCDD3FEBF7

Proposed vernacular: Swallowtail Tuskfish

Figures 20, 21; table 4

Holotype. NSMT-P 110838 (234) Indian Ocean, Seychelles, Saya de Malha Bank, 10° 35' S, 61° 35' E, 4 December 1978, FV Ryuyo-maru 2 (orig. no. SKSK8896).

Paratype. (1 specimen, 164 mm SL.) NSMT-P 111345 (164) Indian Ocean, Seychelles, Saya de Malha Bank, 10° 36' S, 61° 34' E, 30 November 1978, FV Ryuyo-maru 2 (orig. no. SKSK8523).

Diagnosis. Dorsal fin rays XII, 8; anal fin rays III, 10; pectoral fin rays ii, 14, rarely 15, dorsalmost ray dorsalmost ray of moderate length 30.7–30.9% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular; body deep, 39.8–40.7% SL, head depth 29.2–31.2% SL, caudal peduncle depth 12.2–13.0% SL; head blunt, dorsal profile of snout moderately steep, snout length 12.2–15.8% SL; predorsal scales approximately 5, reaching forward on dorsal midline to or just in advance of posterior edge of preopercle; cheek partially covered by small, mostly embedded scales in about 8 vertical rows, posteriormost with about 10 scales to upper extent of free preopercular edge, reaching forward almost to corner of upper lip crease, with broad naked margin posteriorly and ventrally on preopercle; subopercle with row of about 10 large embedded scales adjacent ventral edge of preopercle extending forward to just short of below anterior extent of free ventral preopercular edge; each lateral line scale with unbranched laterosensory canal tube; scales above lateral line about 2½; cephalic sensory canal pores moderately numerous confined to lines or short branches associated with major canals; second pair of canines in lower jaw directed dorsolaterally and slightly posteriorly; dorsal and anal fins with very low basal sheath comprising 1–3 progressively smaller accessory scales at deepest; posterior lobe of dorsal and anal fins almost reaching hypural crease; caudal fin double emarginate, upper and lower lobes distinctly but not greatly produced, posterior margin of fin concave, smoothly curved; pelvic fin reaching anus, length 21.4–22.4% SL. Uniformly pale in preservative.

Description. Dorsal fin rays XII, 8; anal fin rays III, 10; caudal fin rays 9 + 12 + 9; pectoral fin rays ii, 14 (14–15); vertebrae 10 + 17 = 27; pleural ribs ending on 10th vertebra; epipleural ribs ending on 12th (13th) vertebra; lateral line scales 27 + 2; scales above lateral line 2½; scales below lateral line approximately 8½; predorsal scales approximately 5 (6); total gill rakers 9.

(See Table 4 for selected measurements expressed as percentage of SL or HL.) Body deep, greatest depth at pelvic fin origin, 2.5 in SL; caudal peduncle moderately slender, depth 8.2 (7.7) in SL; head large and deep, length 2.6 (2.8) in SL, depth at posterior extent of orbit 1.2 in HL; snout of moderate length, 2.4 (2.9) in HL; snout and head broadly rounded; dorsal outline of forehead and snout convexly curved, nape a gentle convex curve; eye large, orbit 5.0 (3.7) in HL; interorbital moderately broad; jaws not attenuate.

Dorsal and anal fin without well developed scaly basal sheath, small scales at base only. Predorsal scales reaching forward on dorsal midline of head barely in advance of above dorsal end of preopercle. Cheek only partially covered by scales, scales small, mostly embedded, about 8 (9) vertical rows, posteriormost row with about 10 (13) scales to upper extent of free preopercular edge, scales reaching forward almost to corner of upper lip crease, broad naked margin posteriorly and ventrally on preopercle; opercle fully covered by large embedded scales; subopercle with row of about 10 large embedded scales adjacent ventral edge of preopercle extending forward to just short of below anterior extent of free ventral preopercular edge; lower jaw naked. Lateral line scales each with unbranched laterosensory canal tube. Cephalic sensory canal pores moderately numerous confined to lines or short branches associated with major canals. Posterior edge of preopercle very finely serrate. Mouth mostly horizontal, posterior corner of upper lip fold below point just anterior to forward extent of orbit; lower lip moderately narrow; upper lip narrow and mostly obscured by skin flap, except at anterior end of jaw; posterior end of maxilla not exposed. Gill rakers on first arch small, simple, those dorsally (about 6) and ventrally (about 5) distinctly finer than fleshy intermediate rakers.

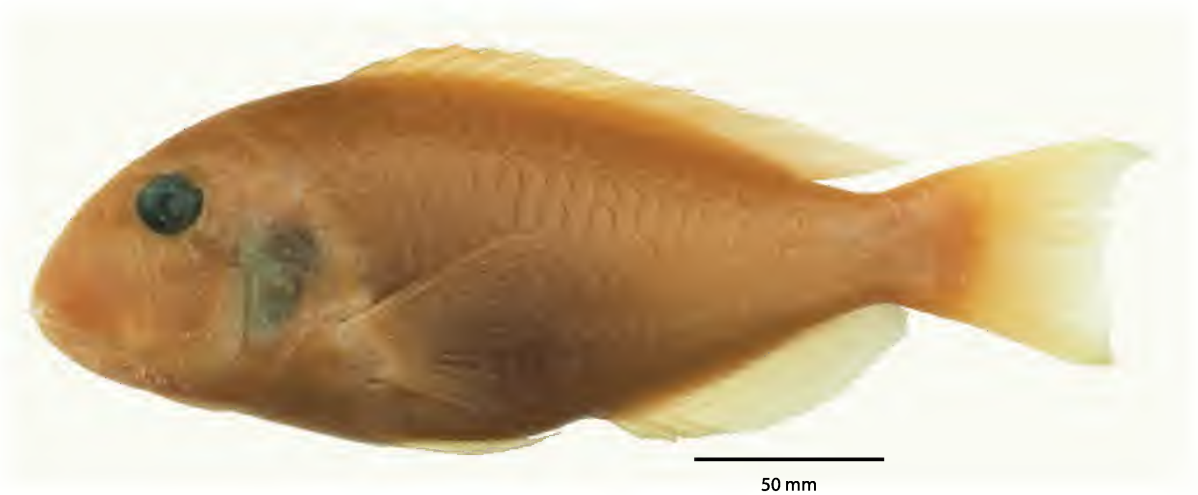

Figure 20. *Choerodon cypselurus* sp. nov. Holotype, NSMT-P 110838, 234 mm SL, Indian Ocean, Seychelles, Saya de Malha Bank, 10° 35' S, 61° 35' E, ethanol preserved.

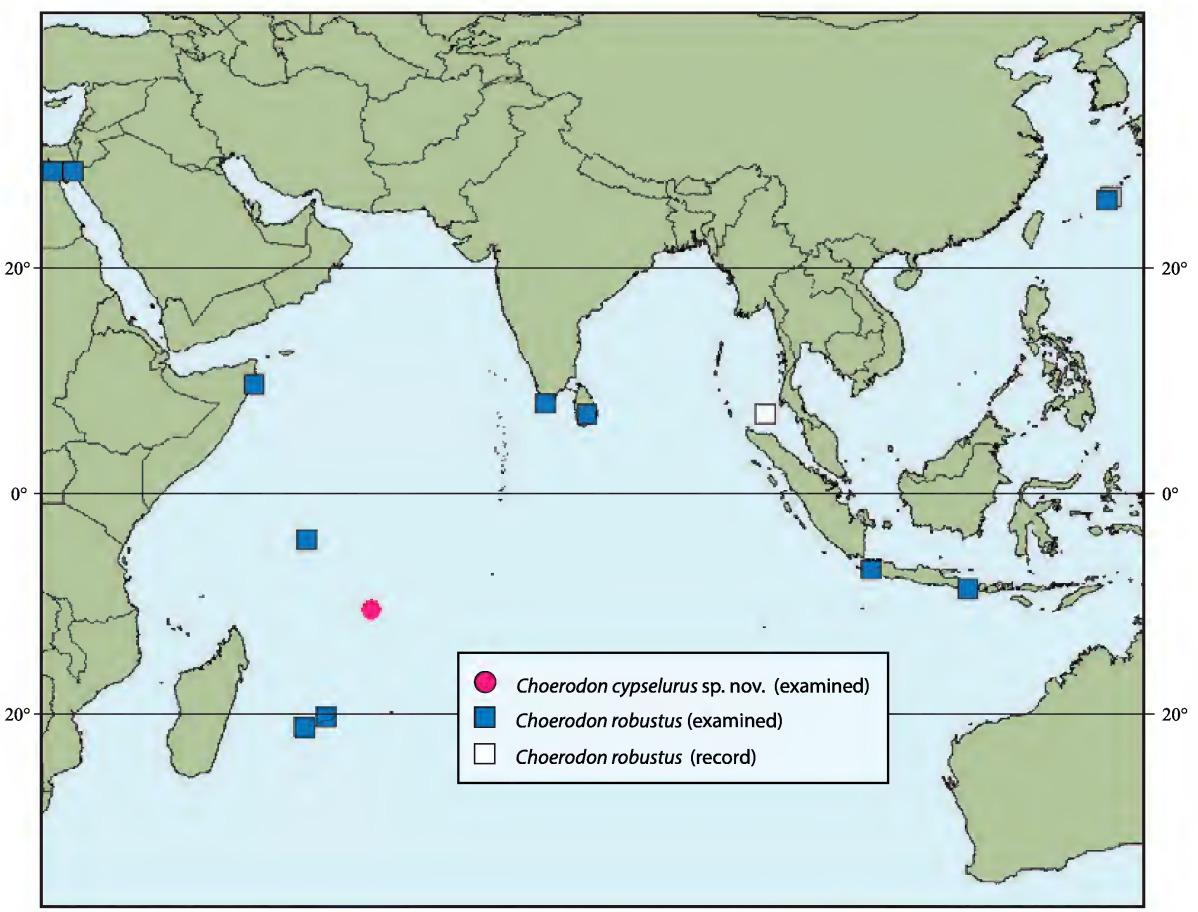

Figure 21. Distributions of *Choerodon cypselurus* sp. nov. (circles) and *C. robustus* (squares) based on specimens examined (coloured) and collection registration records (white).

Table 4. Ranges for selected counts and proportional measurements in species of the subgenus *Aspiurochilus*. "N" designates number of counts or measurements. Aberrant values enclosed by parentheses.

Species	*C. azurio*			*C. cypselurus nsp*		C. monostigma			*C.robustus*			*C. zamboangae*		
MERISTIC FEATURES			N	**Holotype**	**Paratype**			**N**			**N**			**N**
Dorsal fin	XIII, 7		9	XII, 8	XII, 8	XIII, 7		11	XII, 8 (XI, 9)		19	XII (IX), 8		13
Anal fin	III, 10		9	III, 10	III, 10	III, 10		11	III, 10		19	III, 10		13
Pectoral fin	ii, 14 (15)		24	ii, 14	ii, 14/15	ii, 14 (15)		20	ii, 14		34	ii, 14		20
Vertebrae	10 + 17 = 27		10	10 + 17 = 27	10 + 17 = 27	10 + 17 = 27		10	10 + 17 = 27		12	10 + 17 = 27		13
MORPHOMETRIC FEATURES														
Standard length (mm)	58.6–308			234	164	64.1–158			146–278			95.6–244		
% SL	range	mean	N			range	**mean**	**N**	range	**mean**	**N**	range	**mean**	**N**
Body depth	34.8 – 45.9	40.3	14	40.7	39.8	37.4 – 44.3	40.9	16	31.5 – 44.0	39.1	23	36.1 – 40.7	38.1	19
Caudal peduncle depth	14.7 – 16.8	15.9	10	12.2	13.0	14.6 – 15.7	15.2	11	12.8 – 15.9	14.5	21	13.3 – 15.8	14.5	13
Head length	33.3 – 37.3	35.5	15	38.4	35.5	34.9 – 39.3	36.6	13	31.3 – 41.3	36.3	24	32.7 – 38.5	36.2	23
Head depth	26.6 – 42.2	32.4	15	31.2	29.2	29.8 – 35.9	32.9	11	28.9 – 39.2	32.3	24	29.0 – 34.5	31.9	23
Orbit diameter	6.2 – 10.3	8.2	14	7.7	9.6	7.7 – 11.3	8.8	12	5.7 – 8.7	7.4	23	7.3 – 10.1	8.6	17
Interorbital width	4.7 – 11.2	8.2	10	10.4	10.3	7.0 – 10.0	7.8	10	7.3 – 10.9	8.9	21	6.0 – 10.3	8.5	13
Snout length	10.2 – 15.5	12.3	10	15.8	12.2	9.9 – 14.8	13.2	12	12.6 – 16.7	14.6	20	12.3 – 16.2	14.1	13
Dorsal fin base length	50.7 – 60.3	56.4	10	53.6	53.1	52.1 – 59.6	55.9	12	49.8 – 58.2	55.0	21	49.7 – 58.2	54.7	11
Dorsal fin last spine length	9.4 – 13.8	12.1	10			8.0 – 12.4	10.7	12	9.3 – 13.3	10.6	20	8.8 – 14.7	11.6	11
Dorsal fin posterior lobe length	12.6 – 15.5	13.8	14	12.7	11.4	12.9 – 16.8	14.9	10	12.0 – 14.6	13.1	19	11.1 – 13.6	12.2	19
Anal fin base length	23.3 – 30.1	26.4	10	23.0	25.2	24.9 – 32.8	29.5	12	23.6 – 28.3	25.9	21	24.2 – 27.9	25.8	11
Anal fin posterior lobe length	11.5 – 16.1	13.2	14	14.3	12.0	10.4 – 19.0	14.4	10	11.5 – 15.4	13.3	21	10.7 – 14.0	12.5	16
Pectoral fin length	18.2 – 29.0	26.3	14	27.7	27.6	26.3 – 33.3	30.5	13	23.1 – 28.3	26.0	20	22.2 – 30.1	26.8	20
1st pectoral fin ray length	7.5 – 10.2	9.2	11			9.3 – 14.4	11.0	11	6.8 – 10.2	8.2	14	7.9 – 11.1	9.3	15
Pelvic fin length	17.8 – 23.6	21.5	13	22.4	21.4	18.8 – 24.1	21.2	12	21.4 – 24.8	22.8	18	21.1 – 24.9	22.8	18
Caudal fin dorsal lobe length	23.3 – 27.0	25.8	8	28.7	26.7	23.2 – 29.5	26.0	10	24.0 – 28.0	26.2	13	24.5 – 31.6	27.2	11
Caudal fin central ray length	25.0 – 30.2	26.7	9	21.9	19.9	23.7 – 29.2	25.4	10	18.8 – 26.6	23.4	19	22.1 – 30.3	25.7	11
Head length (mm)	21.5–115			89.9	58.3	24.1–56.7			52.7–104			32.7–86.6		
% HL	range	mean	N			range	**mean**	**N**	range	**mean**	**N**	range	**mean**	**N**
Head depth	72.3 – 114	91.4	15	81.1	82.2	75.9 – 100	89.3	11	80.0 – 101	89.2	24	81.2 – 96.9	88.1	23
Orbit diameter	16.7 – 27.8	23.0	14	20.0	27.0	21.2 – 29.9	24.0	12	16.3 – 25.1	20.6	23	19.2 – 27.8	23.7	17
Interorbital width	13.0 – 31.2	23.1	10	27.0	28.9	18.2 – 26.3	21.2	10	22.8 – 28.6	24.8	21	17.0 – 28.8	23.2	13
Snout length	28.9 – 43.2	34.4	10	41.1	34.2	26.3 – 40.8	36.1	12	35.7 – 46.8	40.5	20	33.8 – 43.2	38.5	13
x 100%														
1st pectoral fin ray/pectoral fin length	29.3 – 41.4	35.3	11	30.9	30.7	31.6 – 45.2	36.0	11	24.7 – 36.8	31.3	14	23.9 – 38.6	33.4	16
Orbit diameter/Snout length	43.7 – 96.2	73.6	10	48.7	79.0	53.9 – 114	68.2	12	37.5 – 68.8	52.1	20	46.8 – 82.4	63.1	13

Upper jaw with 2 prominent anterior canines; third very small canine mesial to first prominent canine and adjacent symphysis of jaw; first prominent canine slightly (to distinctly) longer than second; both canines directed mostly ventrally, first slightly laterally, second slightly laterally and recurved slightly posteriorly; dental ridge smooth to slightly rough; posterior canine apparently absent. Lower jaw with 2 prominent anterior canines, both as well as anterior pair of upper jaw exposed when mouth occluded; first canine approximately equal in length to second; first canine directed anterodorsally, second curved dorsolaterally; dental ridge smooth anteriorly, followed by 1 or 2 triangular teeth of moderate size fused with dental ridge and smaller teeth posteriorly. Vomerine teeth absent.

Dorsal fin spines subequal, pungent; pointed membrane behind tip of each spine attached basal to and extending distinctly beyond spine tip, posterior tip of dorsal and anal fin

narrowly rounded, posterior rays not produced; posterior tip of fins reaching to (or almost to) posterior edge of hypurals. Caudal fin emarginate, upper and lower lobes pointed, distinctly but not greatly produced, dorsalmost rays 1.3 times length of rays at centre of fin, posterior margin concave. Pectoral fin with dorsalmost ray of moderate length 30.7–30.9% pectoral fin length, upper rays much longer than lower, posterior edge oblique, almost straight, dorsoposterior corner pointed, posteroventral corner angular to slightly rounded. Pelvic fin of moderate length, posterior tip of fin reaching anus.

Reaches moderately large maximum size, largest specimen examined 234 mm SL.

Pigmentation in alcohol. Uniformly pale (fig. 20).

Fresh colours. Unknown.

Etymology. The name *cypselurus* is from the Greek *kypselos* for "swallow" and *oura* for "tail", in reference to the characteristic swallowtail-like caudal fin of this species that differs from those in other members of the *C. azurio* clade within this genus.

Distribution. Known only from the type series collected on the Saya de Malha Bank, of the Seychelles, in the western central Indian Ocean (fig. 21).

Comments. Of the 25 currently described species of *Choerodon,* all but eight characteristically have 13 spines and seven segmented, branched soft rays in the dorsal fin. Five of the eight species with 12 spines and eight soft rays are members of the subgenus *Pealopesia,* distinguished by a slender body and modified pectoral fin with produced ventral rays that afford the fin a distinctive sickle-shaped profile. The remaining group of three, comprising *Choerodon fasciatus* (Günther, 1867), *Choerodon robustus* (Günther, 1862) and *Choerodon zamboangae* (Seale & Bean, 1907), have a rather deep body and pectoral fin with rays that are progressively shorter ventrally. *Choerodon cypselurus* shares a dorsal fin count and the latter characteristics with these three, but differs from them by the emarginate shape of its caudal fin, the three having a truncate caudal fin without noticeably produced corners. *Choerodon cypselurus* is further separable from *C. fasciatus* by its pectoral fin count of ii, 14 (rarely 15), versus ii, 13 in the latter, and number of predorsal scales, approximately five that extend forward only to above the preopercular margin, in contrast with 10–14, which reach forward in advance of above the posterior extent of the orbit on the dorsal midline of the head. Although the faded condition of the type specimens precludes a description of life colours, they are unlikely to be as distinctive as the prominent banding of *C. fasciatus,* which perseveres in preservation.

Choerodon monostigma (Ogilby, 1910)
Darkspot Tuskfish

Figures 19, 22; table 4; appendix.

Choirodon monostigma Ogilby, 1910b:102, 13 miles from Pine Peak bearing S 58° E (~21° 25 'S, 150° 08 ' E; Queensland).

Diagnosis. Dorsal fin rays XIII, 7; anal fin rays III, 10; pectoral fin rays ii, 14, rarely 15, dorsalmost ray of moderate length 31.6–45.2% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular; body deep, 37.4–44.3% SL, head depth 29.8–35.9% SL, caudal peduncle depth 14.6–22.8% SL; head bluntly pointed, dorsal profile of snout moderately steep, snout length 9.9–14.8% SL; predorsal scales approximately 7–11, variably reaching forward on dorsal midline to above posterior extent of eye or to above middle of eye; cheek with small partially embedded scales in about 5 diagonal rows, posteriormost with about 9 scales to upper extent of free preopercular edge, reaching forward to above anterior end of ventral preopercular margin, with very broad naked margin posteriorly and ventrally on preopercle; about 3 or 4 rows (only about 2 scales in second to 4th rows when present) of about 8 small scales on subopercle adjacent preopercular edge extending forward to about anterior end of ventral preopercular margin; each lateral line scale with mutlple branching laterosensory canal tube; scales above lateral line about 2½ or 3; about 2 rows of superorbital cephalic sensory canal pores and about 8 vertical rows of suborbital pores; second pair of canines in lower jaw directed anterodorsally and slightly laterally; dorsal and anal fins with very low basal sheath comprising 2 or 3 progressively smaller accessory scales at deepest; posterior lobe of dorsal and anal fins reaching to or beyond hypural crease; caudal fin truncate to slightly rounded; pelvic fin reaching to base of first anal fin spine in largest individuals, length 18.8–24.1% SL. (See Table 4 for additional meristic and morphometric ranges.) Pink to green above with faint brown bands on head and side; prominent black spot on dorsal fin from 11th to 13th spines; yellow-edged blue lines on head and fins.

Reaches moderately small maximum size, largest specimen examined 225 mm SL.

Pigmentation in alcohol. Juveniles pale with 7 or 8 evenly spaced vertical dusky bands crossing dorsum and sides; fins pale except for prominent ocellated dark spot between last 3 spines of dorsal fin. Adults similar to juveniles with dusky bands far less prominent or lacking.

Fresh colours. Juveniles similar to adults with more defined banding. Initial phase adults rosy pink to pinkish brown above with narrow brown midlateral stripe and white underside; about 8 faint brown bands most prominent dorsally, first 3 on predorsal region between back of eye and dorsal fin origin, last at termination of dorsal fin base (fig. 22A & B); darker brown dashes where bands cross lateral line; pair of faint blue stripes posteriorly on body centred on lateral midline; head with yellow-edged blue stripe from eye to snout, second along maxilla, third short stripe below posteroventral corner of eye, 4th circling eye dorsoposteriorly; orange blotch covering much of opercle and yellow blotches below eye and at corner of mouth. Spinous portion of dorsal fin yellow with blue to violet midlateral stripe and large blue to violet ocellated black spot between 11th and 13th spines; soft portion of dorsal and anal fins blue to mauve with yellow vertical bands and yellow margin; anal fin yellow with subbasal and marginal blue stripes; caudal fin blue with narrow yellow bands and tip. Pectoral fin hyaline; pelvic fin blue with lengthwise yellow lines (Sainsbury & Kailola, 1984: 257, bottom; Kuiter, 2010: 60, bottom fig.; Allen & Erdmann, 2012: 647, top right).

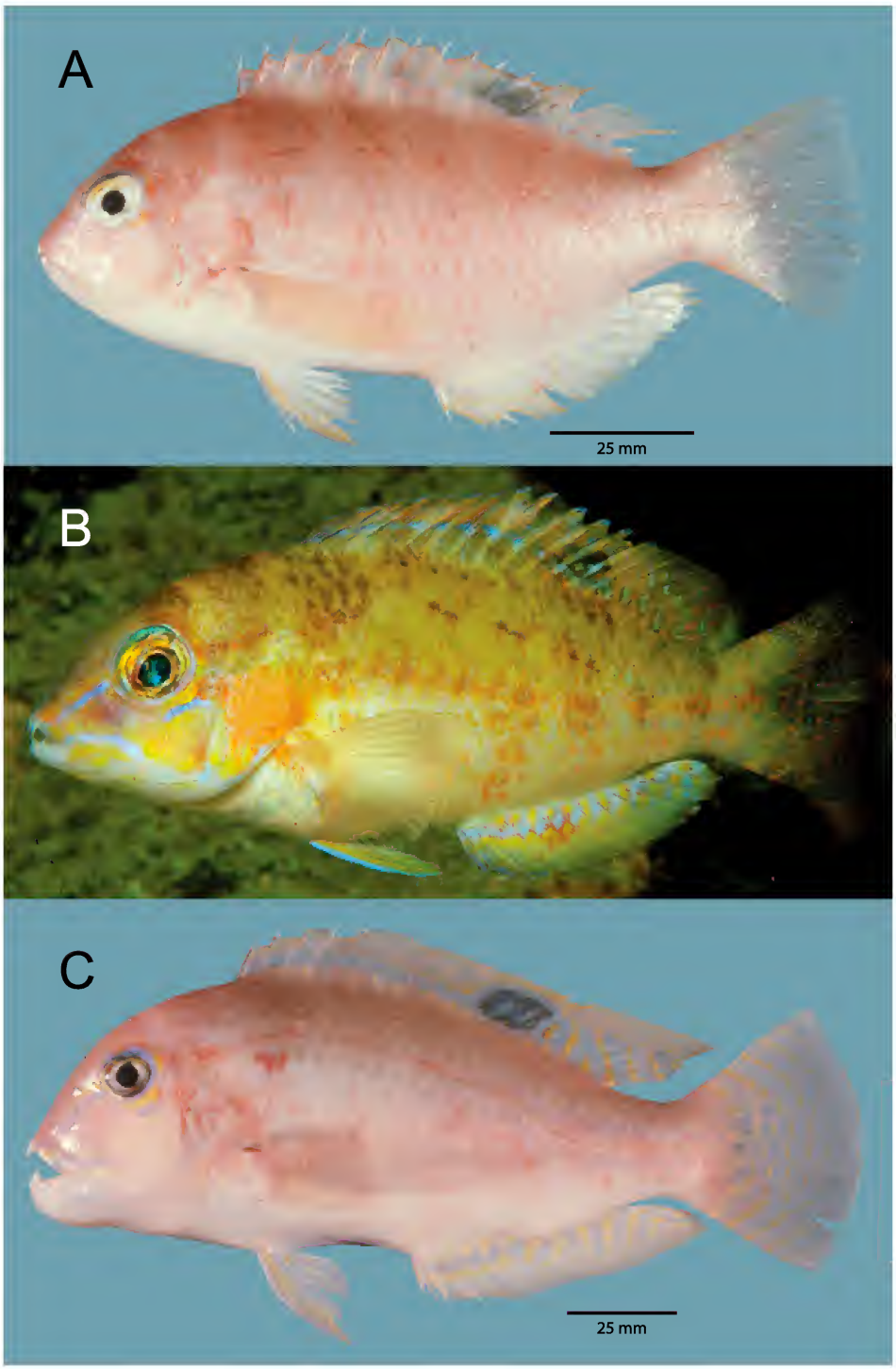

Figure 22. *Choerodon monostigma*. A, Juvenile, CSIRO CA 2169, 114 mm SL, Forestier Island, Western Australia, photo by G. Leyland, CSIRO; B, Initial phase adult, Fakfak Peninsula, West Papua, Indonesia, photo by G. Allen, WAM; C, Terminal phase adult, CSIRO CA 2170 (146) Port Musgrave, Gulf of Carpentaria, photo compliments of CSIRO.

Terminal phase similar to initial phase but more greenish blue dorsally and blue lines on head edged with yellow (fig. 22C).

Etymology. The name *monostigma* is from the Greek *monos* for "single" and *stigma* meaning "spot", in reference to the characteristic violet to black spot present between the last three spines of the dorsal fin of this species.

Distribution. Endemic to northern Australia and the West Papua region of eastern Indonesia, reaching south to Rowley Shoals off Western Australia and Port Curtis, Queensland on Australia's east coast (fig. 19). Lives on sand, silt, open rubble and soft-bottom mixed habitats (Kuiter, 2010; Allen & Erdmann, 2012) at depths of 1–90 m.

Comments. Ogilby's (1910b: 102) account of *Choerodon monstigma* is detailed and leaves no doubt as to the species described. A single specimen registered as a co-type (AMS I.12518, 104 mm SL) is the smaller of his two types and matches the description. The larger type, given as 160 mm TL, is likely to be a Queensland Museum specimen registered as QMB I.1563 (131 mm SL, 155 mm TL) collected at the type locality. Ogilby implied that only a single collection locality near Pine Peak yielded specimens of this species.

A species endemic to northern Australia and southern New Guinea, *C. monostigma* appears to be common in coastal waters at depths of 10–50 m, judging from specimens taken by commercial fishing and survey vessels. *Choerodon monostigma* is unique among relatively deep bodied species in having a prominent black spot above the scaly basal sheath of the dorsal fin between the last few spines.

Material examined. 116 specimens, 55.4–225 mm SL; see appendix.

Choerodon robustus (Günther, 1862)
Robust Tuskfish

Figures 21, 23, 24; table 4; appendix.

Xiphochilus robustus Günther, 1862: 98, Mauritius.

Cossyphus maxillosus Guichenot, 1865: 23, Reunion, *nomen nudum* attributed to Valenciennes.

Choerops dodecacanthus Bleeker, 1868: 275, Borbonia (Reunion).

Diagnosis. Dorsal fin rays XII, 8, rarely XI, 9; anal fin rays III, 10; pectoral fin rays ii, 14, rarely 15, dorsalmost ray of moderate length 24.7–36.8% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular; body deep, 31.5–44.0% SL, head depth 28.9–39.2% SL, caudal peduncle depth 12.8–15.9% SL; head bluntly pointed, dorsal profile of snout moderately steep, snout length 12.6–16.7% SL; predorsal scales approximately 5–7, reaching forward on dorsal midline almost to or slightly in advance of midpoint between posterior extent of orbit and posterior edge of preopercle; cheek with small partially embedded scales in about 6 or 7 diagonal rows, posteriormost with about 16–17 scales to upper extent of free preopercular edge, reaching forward to or almost to corner of upper lip crease above mouth, with very broad naked margin posteriorly and ventrally on preopercle; 1 or 2 rows of about 7–10 small scales (only about 2 scales in second row when present) on subopercle adjacent preopercular edge extending forward to about anterior end of ventral preopercular margin; each lateral line scale with multiple branching laterosensory canal tube; scales above lateral line about 2½; relatively few cephalic sensory canal pores mostly confined to major canals dorsally, rows of pores below eyes; second pair of canines in lower jaw directed mostly dorsally and strongly curved laterally; dorsal and anal fins with very low basal sheath comprising 1–3 progressively smaller accessory scales at deepest; posterior lobe of dorsal and anal fins reaching hypural crease; caudal fin truncate to slightly rounded, upper and lower corners only barely produced at most in large individuals; pelvic fin reaching to or just short of anus, length 21.4–24.8% SL. (See Table 4 for additional meristic and morphometric ranges.) Tan above, white below separated by oblique white band from inner side of pectoral fin base to dorsal side of caudal peduncle, brown in front of band; most scales on side with blue bar forming 6 or 7 horizontal blue lines on caudal peduncle; additional blue lines on head, especially adjacent eye.

Reaches moderately large maximum size, largest specimen examined 285 mm SL.

Pigmentation in alcohol. Juveniles unknown. Initial phase adults dusky anterodorsally, pale posteroventrally, abrupt demarcation between areas a darker diffuse narrow band angled from inner base of pectoral fin to posterior end of dorsal fin base; head slightly dusky above with pale underside; dark line directed anteriorly from middle of anterior border of eye, second horizontal line beneath eye from anterior third of eye nearly to preopercular edge; submarginal dark line on upper lip; anteriorly tapering dusky horizontal stripe on lower jaw from symphysis to anterior end of preoperculer edge; opercular margin with broad dusky margin posteroventrally; dorsal fin dusky with pale distal portion posteriorly and narrow dark dusky distal edge; anal fin pale with dusky distal margin and second narrow dusky stripe separated from margin by narrow pale stripe; caudal fin dusky with fine pale and dusky vermiculations posteriorly and narrow dark dusky dorsal and ventral margins at corners; pectoral and pelvic fins pale. Terminal phase adults similar to initial phase with more pronounced markings on head; scales near middle of side in pale area posteriorly with vertical dusky blotch or spot that align to form faint dusky stripes on caudal peduncle and base of tail.

Fresh colours. Juveniles unknown.

Adults fawn above, white below with broad oblique white band from axilla of pectoral fin to dorsal side of caudal peduncle (fig 23); side adjacent to dorsal edge of pale band dark brown; each scale on side apart from those on band and ventrally on body with pale blue vertical line; 6 or 7 horizontal blue lines on caudal peduncle; lips cobalt blue; blue lines also through centre of orbit, along base of orbit, below orbit, on operculum parallel to posterior edge of preopercle; opercular membrane blue. Dorsal fin yellow with blue basal and distal margins and blue midlateral stripe; anal fin yellow with series of blue spots at base, blue distal margin and distinct yellow

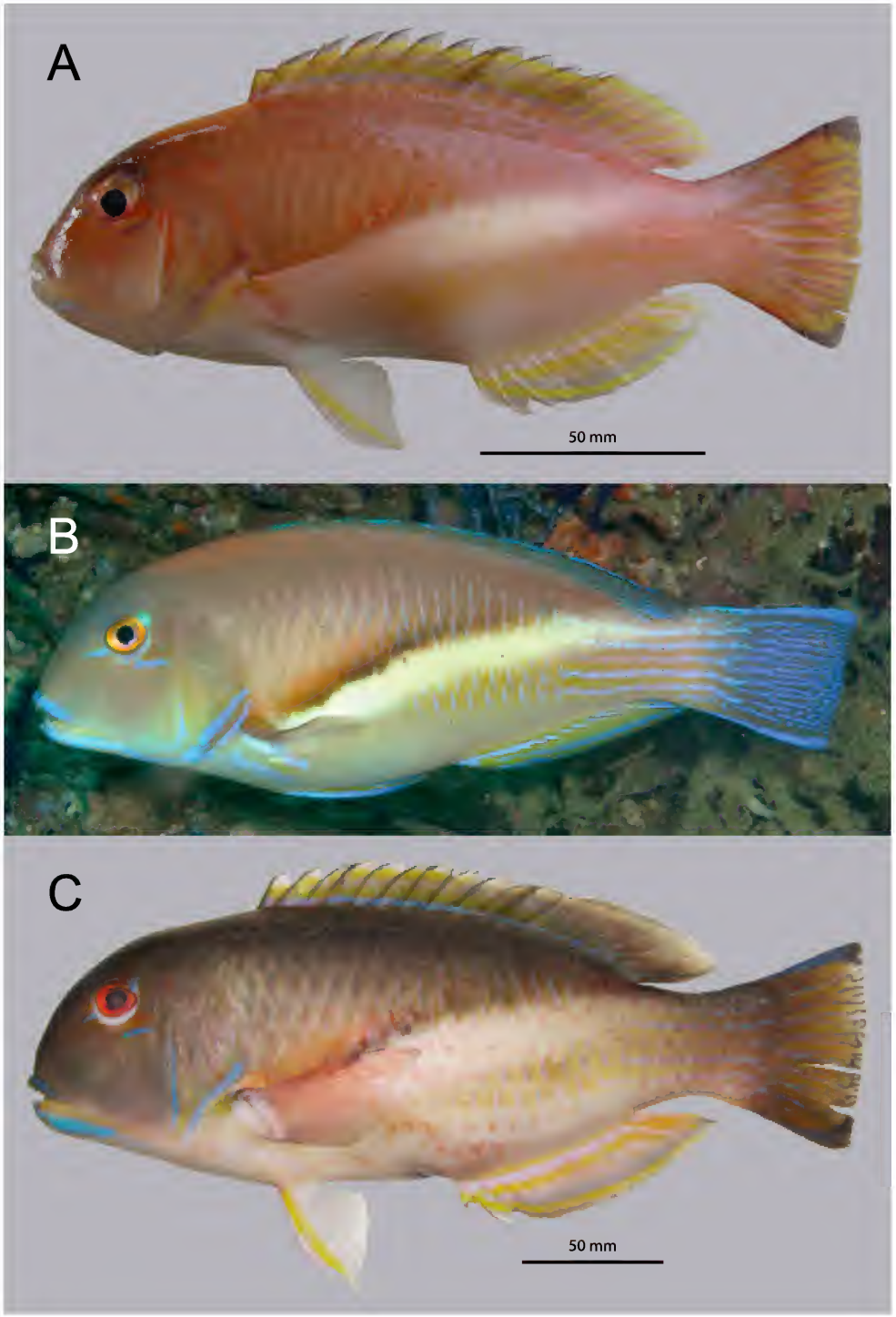

Figure 23. *Choerodon robustus*. A, Initial phase adult, CSIRO H 7989-01, 146 mm SL, Pelabuhanratu, West Java, Indonesia, photo by W. White, CSIRO; B, Presumed initial phase adult, Oman, photo by K. Wilson; C, Terminal phase adult, MZB 23115, 220 mm SL, Pelabuhanratu, West Java, Indonesia, photo by W. White, CSIRO.

Figure 24. Pigmentation of preserved specimens showing oblique separation of dusky and pale areas on the body and caudal fin pattern. A, *Choerodon robustus*, CSIRO H 7989-01, 146 mm SL, Indonesia,West Java, Pelabuhanratu, 7° 00' S, 106° 30' E, 11 March 2009; B, *C. zamboangae*, NMV A 31432-001, 157 mm SL, Indonesia, Lombok, Tanjung Luar, 8° 48' S, 116° 2' E, 26 February 2011; photo by C. Devine, CSIRO.

submarginal stripe; caudal fin with blue lines along rays. Pectoral and pelvic fins pale fawn; pelvic with blue marginal line and yellow submarginal line along leading edge (Bleeker, 1874: pl. 3; Masuda *et al*., 1984: pl. 194, fig. D; Kuiter, 2010: 54, bottom figs A–C; Allen & Erdmann, 2012: 647 bottom; White *et al*., 2013: 267, fig. 89.16).

Etymology. The name *robustus* is a Latin word meaning "hard and strong like oak", perhaps to contrast this species with another considered by Günther as appropriately referred to the genus *Xiphochilus* (=*Xiphocheilus*), *X. typus*, a much more slender species.

Distribution. The distribution of the species is remarkably broad for members of the genus with verified specimens known from Eilat in the Red Sea and Persian Gulf to Mauritius and Reunion, the central Indian Ocean, including Sri Lanka and the Seychelles, north-eastern Indian Ocean west of the Malayan Peninsula (Kyushin *et al*., 1977: 296), the Indian Ocean coasts of Indonesia off eastern Java and Bali, and Wakayama, Japan (Mabuchi *et al*., 2002: 388, fig. 1A) in the north-western Pacific (fig. 21) at depths of 20–120 m. Specimens collected off north-western Australia in collections initially identied as *C. robustus* have proven to be large individuals of *C. zamboangae*.

Comments. *Xiphochilus robustus*, described by Günther (1862: 98) in his catalogue of fishes in the British Museum, was based on a mounted specimen (BMNH 1840.12.12.10, 275 mm SL) from Dr Janvier's collection obtained in Mauritius that retained little of its original colour pattern. The species was subsequently figured in Playfair and Günther (1866: pl. XII, fig. 3) from a specimen collected in Zanzibar (presumably BMNH 1867.3.9.20, skin, 242 mm SL). Based on collection specimens, the species is a reasonably common example of the genus in that area.

Guichenot's (1865: 23, 28) *Cossyphus maxillosus*, apparently so named for the form of the species' jaws and attributed to Valenciennes, is regarded as a *nomen nudum* because it appears elsewhere only in synonymies. Three dried and mounted specimens from Reunion identified as this species are in the MNHN collection (A.8264, 275 mm SL; A.8265, 245 mm SL; A.8266, 256 mm SL). All are specimens of *C. robustus*.

Bleeker (1868: 275) based his *Choerops dodecacanthus* on a specimen from Mauritius, distinguishing it from *C. robustus* by the less obtuse profile of the head and the presence of a violet bordered yellow spot on the opercle as figured in Bleeker (1874: pl. 3). A specimen in the Leiden museum (RMNH 6534,

204 mm SL, 240 mm TL) is regarded as the type (Eschmeyer, 2015) but is slightly shorter that the 260 mm given by Bleeker. This specimen otherwise matches the description and is identifiable as *C. robustus*. As discussed below, Parenti and Randall (2000: 10) synonymised *C. pescadoresis* (as *C. pescadorensis*) with *C. robustus* but the name is considered here to be a synonym of *C. zamboangae*.

Choerodon robustus and *C. zamboangae* are among the most often confused species in the genus in collections and the literature because the diagnostic colour patterns are faint, especially in preserved material. Both are bicoloured with the demarcation between the slightly darker anterior pigmentation obliquely angled from behind the pectoral fin base dorsoposteriorly to the dorsal fin base. In specimens where it is still evident, the angle of separation is shallower in the former, ending near the posterior end of the dorsal fin base, but terminating near the middle of the fin base in the latter (fig. 24). The caudal fin of *C. robustus* often retains remnants of a reticulate pattern in advance of the darker posterior margin posteriorly, rather than being more uniformly pale as in *C. zamboangae*.

Mabuchi *et al.* (2002) compared mitochonial DNA of two colour variants of specimens from Japanese waters identified as *C. robustus*, concluding that they represent separate species. Judging from the accompanying figures (Mabuchi *et al.*, 2002: fig. 1), their type A is *C. robustus* and their type B is most likely *C. zamboangae*, although the image of the latter may be that of a terminal phase individual in breeding colouration rather than a more typical pattern.

Sequences attributed to specimens of *C. robustus* involved in the analysis performed by Puckridge *et al.* (2015) are only from Japanese and Indonesian material and therefore do not represent specimens from or near the type locality of the species in the distant western Indian Ocean. To test a hypothesis that individuals in the two widely separated areas represent different taxa, a sequence from a specimen collected on the Mascarene Ridge in the western Indian Ocean was added to the data set in the reanalysis of relationships described above. The outcome confirmed that sequences for specimens of *C. robustus* from all three localities have little or no divergence, thus supporting the identity of the species.

Material examined. 32 specimens, 146–285 mm SL; see appendix.

Choerodon zamboangae (Seale & Bean, 1907)
Zamboangan Tuskfish

Figures 24–26; table 4; appendix.

Choerops zamboangae Seale and Bean, 1907: 236, fig. 6, Zamboanga (Philippines).

Choerodon melanostigma Fowler and Bean, 1928: 199, Jolo Market, Jolo (Philippines).

Choerodon pescadorensis Yu, 1968: 10, fig. 4, Pescadores (Taiwan).

Diagnosis. Dorsal fin rays XII, 8; anal fin rays III, 10; pectoral fin rays ii, 14, dorsalmost ray of moderate length 23.9–38.6% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular; body deep, 36.1–40.7% SL, head depth 29.0–34.5% SL, caudal peduncle depth 13.3–15.8% SL; head blunt, dorsal profile of snout steep, snout length 12.3–16.2% SL; predorsal scales approximately 7 or 8, variably reaching forward on dorsal midline almost to or distinctly in advance of midpoint between posterior extent of orbit and posterior edge of preopercle; cheek with small partially embedded scales in about 6–9 diagonal rows, posteriormost with about 10 or 11 scales to upper extent of free preopercular edge, reaching forward just in advance of corner of upper lip crease above mouth, with very broad naked margin posteriorly and ventrally on preopercle; 1 or 2 rows of about 6–11 small scales (only 1–4 scales in second row when present) on subopercle adjacent preopercular edge extending forward to about anterior end of ventral preopercular margin; each lateral line scale with multiple branching laterosensory canal tube; scales above lateral line about 2½ or 3; dorsal and anal fins with very low basal sheath comprising 2 or 3 progressively smaller accessory scales at deepest; posterior lobe of dorsal and anal fins reaching to or beyond hypural crease; cephalic sensory canal pores numerous dorsoposterior to eye but relatively few associated with major canals elsewhere; second pair of canines in lower jaw directed mostly dorsally and strongly curved laterally; dorsal and anal fins with very low basal sheath comprising 1–3 progressively smaller accessory scales at deepest; posterior lobe of dorsal and anal fins reaching just past hypural crease; caudal fin truncate to slightly rounded, upper and lower corners square, only barely produced at most in large individuals; pelvic fin reaching to or just short of anus, length 21.1–24.9% SL. (See Table 4 for additional meristic and morphometric ranges.) Brown to green above, white below, separated by anteriorly tapering dark brown wedge-shaped band from behind pectoral fin base to below rear third of dorsal fin, with nearly horizontal yellow to orange stripe immediately below; head with blue lines above and below eye and on lower jaw.

Reaches moderate maximum size, largest specimen examined 249 mm SL.

Pigmentation in alcohol. Juveniles and subadults pale with large elongate dark blotch angled anteroventrally from bases of first few segmented dorsal fin rays, followed posteriorly by distinctly pale smaller blotch adjacent to dorsal edge of side. Initial phase adults pale with faint dusky to dark anteroventrally tapering wedge-shaped blotch below bases of soft dorsal fin rays directed towards inner side of pectoral fin base; head pale with short, broad dark line directed anteriorly from middle of anterior border of eye, second horizontal line beneath eye from anterior third of eye nearly to preopercular edge; similar dark mark on top of eye; broad dusky horizontal stripe on lower jaw from symphysis to anterior end of preoperculer edge; opercular margin with faint narrow dusky margin posteroventrally; pectoral fin base with dusky band at base of dorsalmost rays; dorsal fin pale with narrow dark distal edge becoming slightly broader posteriorly; anal fin pale with dusky basal and margin stripes, as well as third narrow dusky stripe separated from marginal stripe by narrow pale stripe; caudal fin pale to slightly dusky with darker periphery; pectoral and pelvic fins pale.

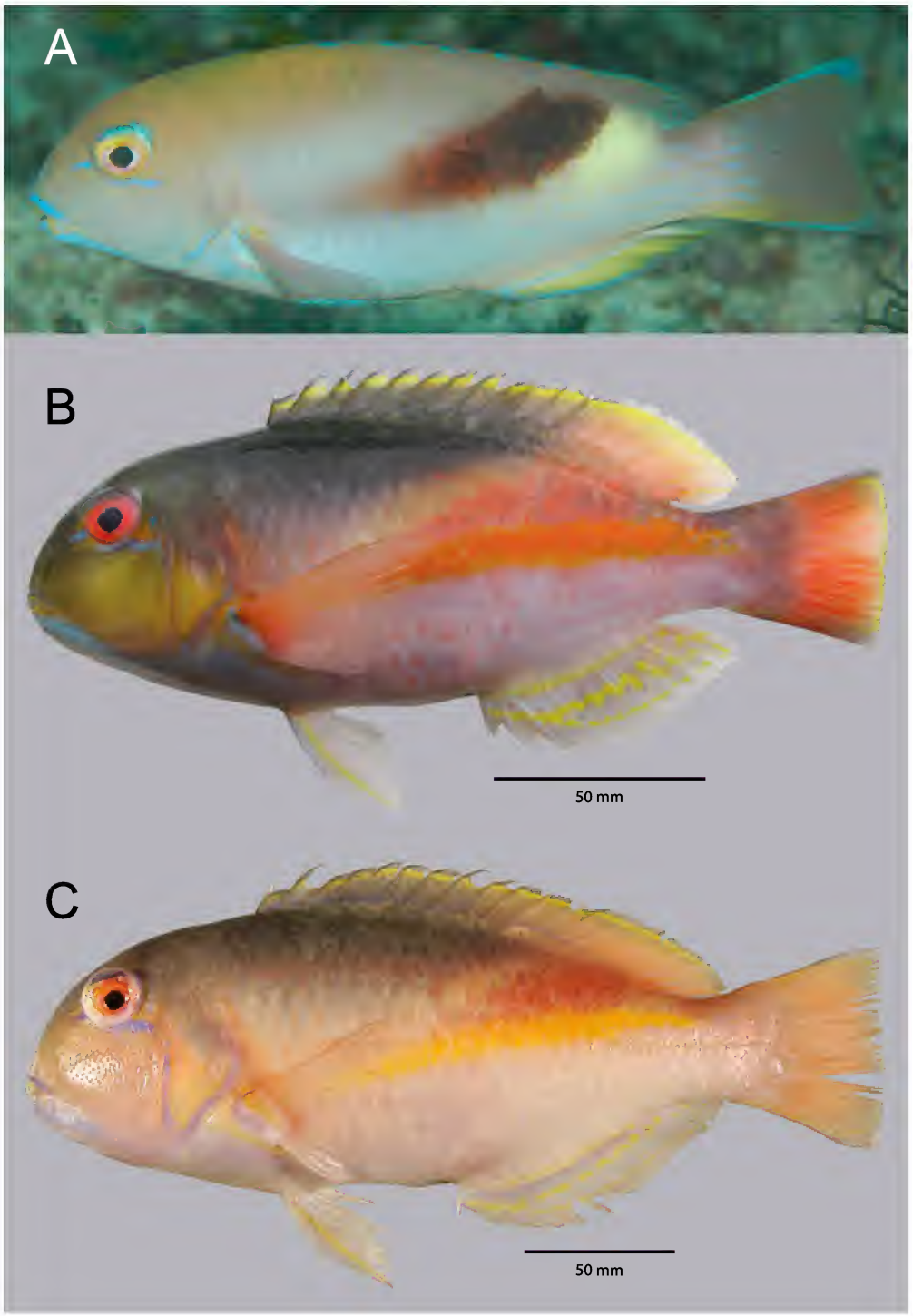

Figure 25. *Choerodon zamboangae*. A, Juvenile, Milne Bay, Papua New Guinea, photo by G. Allen, WAM; B, Initial phase adult, CSIRO H 7219-07, 166 mm SL, Tanjung Luar, Lombok, Indonesia, photo by W. White, CSIRO; C, Terminal phase adult, NMV A 29706-001, 244 mm SL, north-western Australia, photo by J. Pogonoski, CSIRO.

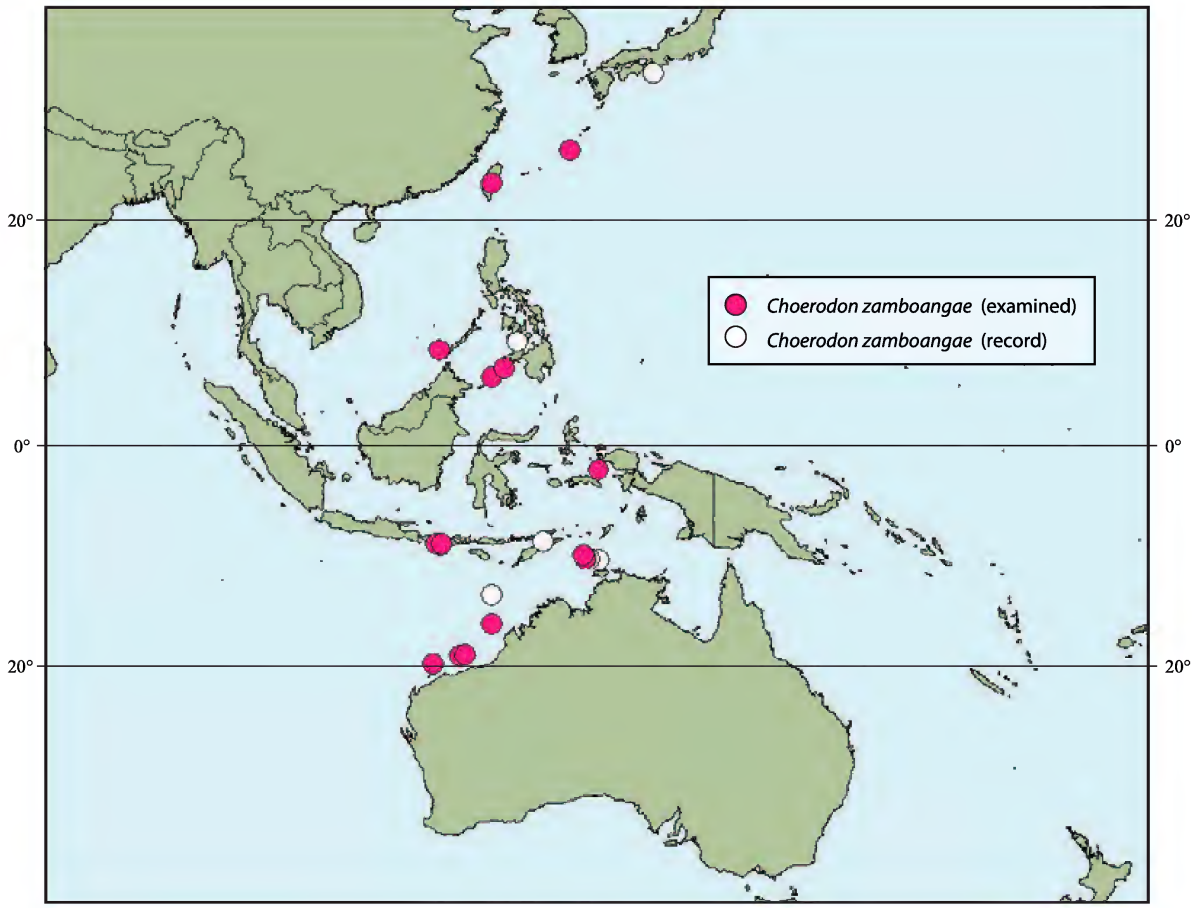

Figure 26. Distribution of *Choerodon zamboangae* based on specimens examined (coloured) and collection registration records (white).

Terminal phase adults similar to initial phase with pronounced dusky area anterodorsally and pale area posteroventrally, abrupt demarcation between areas angled from inner base of pectoral fin to bases of last couple of dorsal fin spines, dusky area quite dark above lateral line; freshly preserved specimens with immaculate anteroventrally tapering wedge-shaped area below middle of dorsal fin base adjacent to dusky area; dorsal fin with similar pigmentation as that on adjacent side.

Fresh colours. Juveniles and subadults with dark brown to black slanted wedge-shaped patch instead of orange stripe or patch obscuring stripe mesoposteriorly from midside below central dorsal fin spines to bases of segmented dorsal fin rays followed posteriorly by prominent yellow spot at termination of dorsal fin base (fig. 25A); blue markings on head as in adults (Allen & Erdmann, 649, centre left).

Initial phase adults red to reddish brown dorsally, white ventrally with dark reddish brown to black anteriorly tapered wedge-shaped oblique band angled from midside below central dorsal fin spines to bases of segmented dorsal fin rays followed posteriorly by prominent yellow spot at termination of dorsal fin base, dark wedge overlying angled orange stripe from axilla of pectoral fin to caudal fin base just above lateral midline (fig. 25B); cheeks yellow, opercle orange; underside of head and chest pale blue, extending dorsally to free margin of opercle and preopercle; 3 short blue lines and spot adjacent to eye. Dorsal fin pale blue to purple anteriorly, reddish purple posteriorly with dark blue to purple basal and distal margins and yellow subdistal stripe; anal fin blue to purple with yellow basal stripe, spots and and ocelli; caudal fin red with blue to purple distal margin and yellow submarginal streaks. Pectoral fin red, base golden; pelvic fin pale blue with blue marginal and yellow submarginal lines on leading edge. (Chen *et al*., 2010: 382, fig. E; Kuiter, 2010: 54, top figs B & C; Allen & Erdmann, 2012: 649, top right)

Terminal phase adults dark red above, paler below with horizontal orange stripe from upper end of pectoral fin base to middle of caudal peduncle (fig. 25C); some with broad oblique yellow stripe angled from upper side of pectoral fin base towards bases of last few dorsal fin spines; dorsal side of head

and nape slate green; lips yellow with blue submarginal line; head colouration otherwise as in initial phase individuals (Masuda *et al*., 1984: pl. 194, fig. C, as *C. robustus*; Sainsbury & Kailola, 1984: 259, bottom; Shen, 1993: pl. 144, fig. 5, as *C. robustus*; Shibukawa, Peristiwady & Suharti, in Kimura & Matsuura, 2003: 147, as *C. robustus*; Kuiter, 2010: 54, top figs A, D & E; Allen & Erdmann, 2012: 649, centre right; White *et al*., 2013: 267, fig. 89.18 male).

Etymology. The name *zamboangae* acknowledges the type locality of this species, Zamboanga in the Philippines.

Distribution. Reliable occurrences range from Wabuka in southern Honshu, Japan (Ikeda & Nakabo, 2015: 454, pl. 177-4) and Taiwan, through the Philippines to Lombok and Raja Ampat, Indonesia, Timor Leste and north-western Australia south of Rowley Shoals (fig. 25). Reported from seaward reef slopes and rubble bottom at depths of 20–140 m (Allen & Erdmann, 2012: 649).

Comments. *Choerops zamboangae* was described by Seale and Bean (1907) from two preserved adult specimens (USNM 57846: 236, 226 mm SL, holotype, USNM 61154, 203 mm SL, paratype) collected in Zamboanga, Mindinao, Philippines, with the remnants of an orange lateral stripe present in fresh material. The types of Fowler and Bean's (1928: 199) *Choerodon melanostigma* are smaller (USNM 89967, 171 mm SL, holotype; USNM 5578, 95.6 mm SL and USNM, 5579, 164 mm SL, paratypes) than the *C. zamboangae* types and have a dark wedge-shaped blotch from the midside to the base of the rear third of the dorsal fin with contrasting pale areas preceding and following the dark area. Morphologically, the two appear identical. Kuiter (2010: 54) and Allen and Erdmann (2012: 649) figured some individuals with the horizontal orange stripe on the side described by Seale and Bean (1907: 236–237) and others with the dark marking described by Fowler and Bean (1928: 199–200) as *C. zamboangae*, as well as a few with both, stating that the dark marking is present in juveniles and females but not in larger, presumably male, individuals. Their interpretation appears to be justified.

Choerodon pescadoresis Yu, 1968 was synonymised (as *Choerodon pescadorensis*) with *C. robustus* by Parenti & Randall (2000: 10) on the authority of S. C. Shen (personal communication). As with *C. quadrifasciatus*, Yu's type of *C. pescadoresis* was not found at the National Museum of Marine Biology and Aquarium, Pintung, Taiwan and is thought to be lost. The original description more closely matches *C. zamboangae* and is considered to be a synonym of that species.

Choerodon zamboangae closely resembles *C. robustus* in general colouration and in particular the markings on the head and tail. Specimens of the former examined in Japanese and Taiwanese collections were frequently misidentified as the latter. Morphologically, the profile of the head and snout is more rounded in initial phase adults of *C. zamboangae* and the body is slightly shallower. The blue stripe on the lower jaw of the former broadly wraps around the underside at the front, while the stripe in *C. robustus* tapers to a narrow line across the symphysis. The scales on the sides of *C. zamboangae* lack the blue spot or vertical blue line characteristic of *C. robustus*. In preservation, the demarcation between the dusky and pale areas on the side is between the inner side of the pectoral fin and the base of the last couple of dorsal fin spines in *C. zamboangae*, except in smaller individuals that retain remnants of the dark anteroventrally tapering wedge-shaped blotch below the bases of the soft dorsal fin rays (fig. 24B). In *C. robustus* the two areas are separated between the inner side of the pectoral fin and the rear end of the dorsal fin base (fig. 24A). The two species appear to be mostly allopatric with *C. robustus*, which is by far the more broadly distributed. Documented overlap areas are confined to southern Japan and Taiwan. Puckridge *et al*. (2015: figs 1 & 2d) and the reanalysis provided above both recovered the two as sister species.

Material examined. 36 specimens examined, 95.6–249 mm SL; see appendix.

Choerodon (Lienardella) (Fowler & Bean, 1928)

Table 2

Lepidaplois (*Lienardella*) Fowler & Bean, 1928: 202, type species – *Lepidaplois mirabilis* Snyder (= *C. fasciatus*) by monotypy.

Diagnosis. Dorsal fin rays XII, 8; anal fin rays III, 10; pectoral fin rays ii, 13, dorsalmost ray of moderate length 21.3–34.5% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular to broadly rounded; body moderately deep, 40.7–44.7% SL, caudal peduncle depth 15.1–17.1% SL, head depth 27.8–31.9% SL; head bluntly pointed, dorsal profile of snout moderately steep, snout length 10.5–14.9% SL; predorsal scales approximately 10–14, reaching forward on dorsal midline to above centre of eye; cheek with small partially embedded scales in about eight or nine diagonal rows, posteriormost with about 10 scales to upper extent of free preopercular edge, reaching forward almost to corner of upper lip crease above mouth, with very broad naked margin posteriorly and ventrally on preopercle; 1 or 2 rows of about 8 small scales (only about 2 scales in second row when present) on subopercle adjacent preopercular edge extending forward nearly to anterior end of ventral preopercular margin; each lateral line scale with unbranched laterosensory canal tube; scales above lateral line about 3½; cephalic sensory canal pores confined to lines or short branches associated with major canals on top of head, scattered pores more numerous anteroventral to eye; second pair of canines in lower jaw mostly straight directed dorsolaterally; dorsal and anal fins with relatively deep scaley basal sheath comprising approximately about 2–4 enlarged scales; posterior lobe of dorsal and anal fins reaching just short of hypural crease; caudal fin truncate, corners pointed; pelvic fin not reaching anus, length 21.1–25.6% SL. (See Table 2 for additional meristic and morphometric ranges.) Head and body with prominent vertical bands, dark grey and white in juveniles, red to black and white in adults.

Comments. Fowler and Bean (1928) erected *Lienardella* as a subgenus of *Lepidaplois* (= *Bodianus*), saying they had examined the type specimen of the type species *L. mirabilis* Snyder and believed it to be allied with the subgenus

Lepidaplois. Oddly, the statement immediately followed a diagnosis of the genus *Lepidaplois* where they obviously overlooked the discrepancy in dorsal and anal fin rays counts between *Lepidaplois* and *L. mirabilis*. They also failed to recognise the similarity of meristic values of *L. mirabilis* with those provided in their preceding treatment of *Choerodon*, despite the incomplete nature of the diagnosis in the latter. The name was subsequently elevated to genus by Myers (1939: 88) and then synonymised with *Choerodon* by Gomon (1997: 809).

This monotypic subgenus (fig. 1, clade 4a) is strikingly patterned, the starkly contrasting black and white bands of adults distinctly unlike colour patterns of other species. Predorsal scales in the one species reach to above the centre of the eyes, well in advance of that in all others, except *C. monostigma* and *C. vitta*, which have predorsal scales extending almost as far or as far forwards. The scaley basal sheaths on the dorsal and anal fins are also considerably deeper than those of other species.

Choerodon fasciatus (Günther, 1867)
Harlequin Tuskfish

Figures 27, 28; table 2; appendix.

Xiphochilus fasciatus Günther, 1867: 101, pl. X, Cape York (Queensland), Australia.

Lepidaplois mirabilis Snyder, 1908: 96, Japan and Riu Kiu Islands.

Choerodon balerensis Herre, 1950: 149, Baler, Quezon (Tayabas) Province, Luzon (Philippines).

Diagnosis. Dorsal fin rays XII, 8; anal fin rays III, 10; pectoral fin rays ii, 13, dorsalmost ray of moderate length 21.3–52.6% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular to broadly rounded; body moderately deep, 39.2–44.7% SL, caudal peduncle depth 15.1–17.1% SL, head depth 27.8–31.9% SL; head bluntly pointed, dorsal profile of snout moderately steep, snout length 10.5–14.9% SL; predorsal scales approximately 10–14, reaching forward on dorsal midline to above centre of eye; cheek with small partially embedded scales in about 8 or 9 diagonal rows, posteriormost with about 10 scales to upper extent of free preopercular edge, reaching forward almost to corner of upper lip crease above mouth, with very broad naked margin posteriorly and ventrally on preopercle; 1 or 2 rows of about 8 small scales (only about 2 scales in second row when present) on subopercle adjacent preopercular edge extending forward nearly to anterior end of ventral preopercular margin; each lateral line scale with unbranched laterosensory canal tube; scales above lateral line about 3½; cephalic sensory canal pores confined to lines or short branches associated with major canals on top of head, scattered pores more numerous anteroventral to eye; second pair of canines in lower jaw mostly straight directed dorsolaterally; dorsal and anal fins with relatively deep scaley basal sheath comprising approximately about 2–4 enlarged scales; posterior lobe of dorsal and anal fins reaching just short of hypural crease; caudal fin truncate, corners pointed; pelvic fin not reaching anus, length 21.1–25.6% SL. (See Table 2 for additional meristic and morphometric ranges.) Head and body with prominent vertical bands, dark grey and white in juveniles, red to black and white in adults.

Reaches moderately small maximum size, largest specimen examined 188 mm SL but reported in the literature to reach 300 mm TL.

Pigmentation in alcohol. Juveniles with narrow well-defined dark-edged dusky bands and contrastingly immaculate interspaces extending from tip of snout to base of tail, with prominent ocellated dark spots at front and rear of dorsal fin, midway along anal fin, and at base of pelvic fin, and much smaller dark spots dorsally and ventrally on caudal fin base. Adults pale with prominent broad dark-edged vertical dusky bands on head and body becoming poorly defined ventrally on sides and merging into broad dark area below segmented rays of dorsal fin, continuing narrowly onto base of dorsal fin and broadly onto base of anal fin; posterior end of caudal peduncle and caudal fin abruptly pale; pair of dark lines crossing snout in front of eye with broad dark edged dusky band across top of head between eyes; anterior 2 broad dusky bands on head contiguous with those of opposite side ventrally; dorsal, anal and pelvic fins with narrow dark margins; dark blotch between first 3 spines of dorsal fin; caudal fin with fine dusky edge posteriorly; pectoral fin pale.

Fresh colours. Juveniles with similar patterns as adults but banding brown with dark brown to black edges and with prominent eye-sized ocellated black spots anteriorly and posteriorly on dorsal fin, midway along anal fin and on basal half of pelvic fin. (fig. 27A; Masuda *et al*., 1984: pl. 194, fig. E, as *Lienardella fasciatua*; Kuiter, 2010: 61, figs C–E)

Adults yellow to white with green dorsum and prominent violet edged bright red transverse bands on head and side, 3 crossing head and 6 across side; anterior head band covering snout and jaws, interrupted in front of eye by pair of horizontal blue lines, second through eye, third encircling head at middle of operculum (fig. 27B & C); first band on side broad, passing through dorsal fin origin, subsequent bands narrower and evenly spaced, last across scaly base of caudal fin, posterior bands often obscured in life by dark blue to black pigmentation; teeth blue. Dorsal and anal fins red with blue basal and distal margins, dorsal fin with black spot between first 2 spines; caudal fin white often with broad pink distal margin, sometime yellow near centre. Pectoral fin yellow, red basally; pelvic fin red with blue anterior and posterior margins. (Masuda *et al*., 1984: pl. 194, fig. F, as *Lienardella fasciata*; Shen, 1993: pl. 144, fig. 2; Okamura & Amaoka, 1997: 465, right bottom; Chen et al., 2010: 384, fig. B; Kuiter, 2010: 61, figs A, B & F; Allen & Erdmann, 2012: 646, top; Motomura & Matsuura, 2014: 383, 3 figs)

Etymology. The name *fasciatus* is Latin for "enveloped with bands", in reference to the brilliant red body banding characterising adults of this species.

Distribution. Anti-equatorial from Okinawa in southern Japan to the northern Philippines in the Northern Hemisphere, and Papua New Guinea, the Queensland coast of Australia, Lord Howe Island and New Caledonia south of the equator (fig. 28). Usually shelters in caves or beneath ledges in bays and inner reefs to outer reef lagoons at depths of 4–15 m.

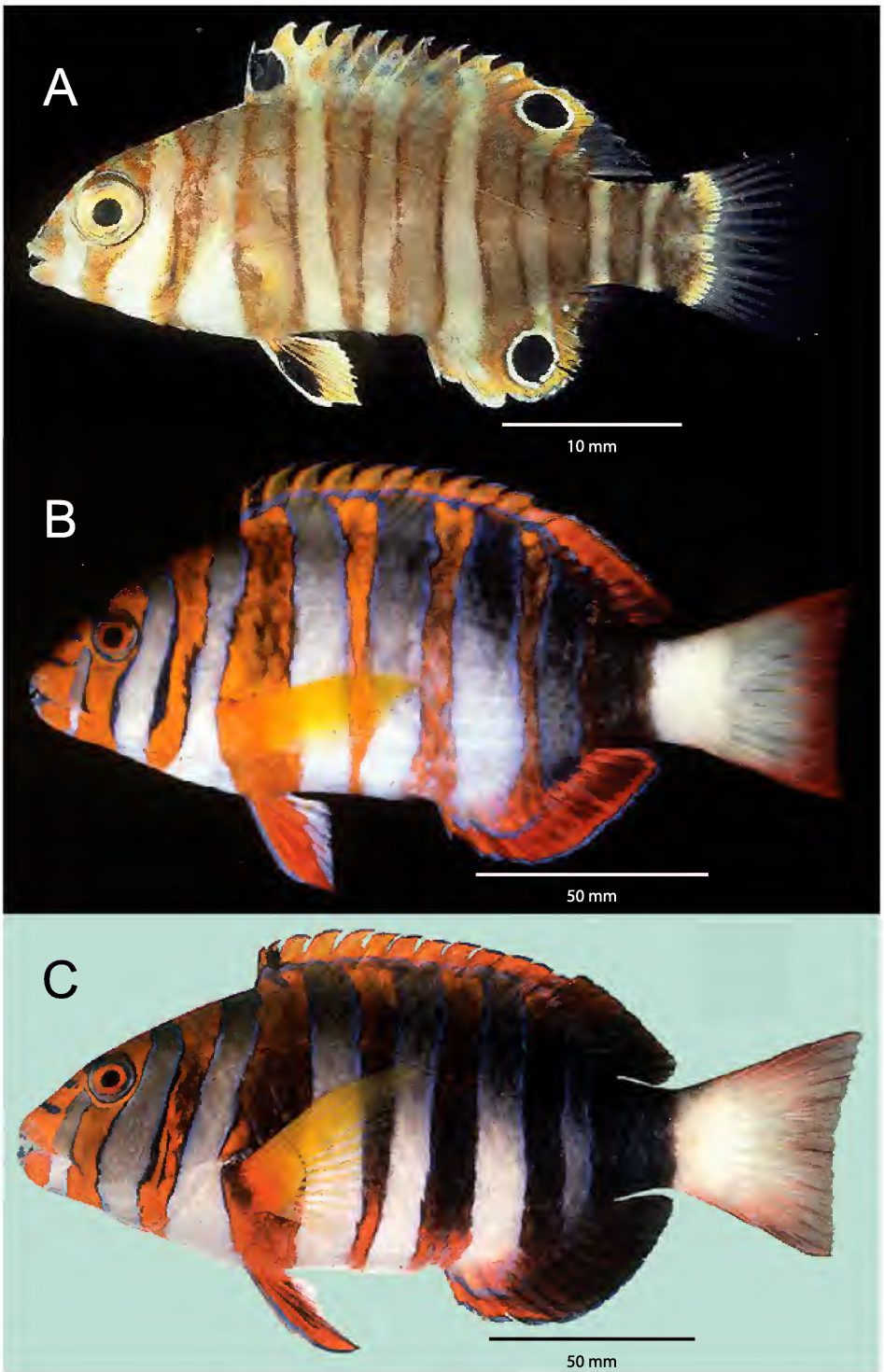

Figure 27. *Choerodon fasciatus*. A, Juvenile, BPBM 27100, 35 mm SL, New Caledonia, photo by J. Randall, BPBM; B, Initial phase adult, BPBM 41249, 140 mm SL, Lizard Island, photo by J. Randall, BPBM; C, MNHN 1980-0782, 162 mm SL, New Caledonia, photo by J. Randall, BPBM.

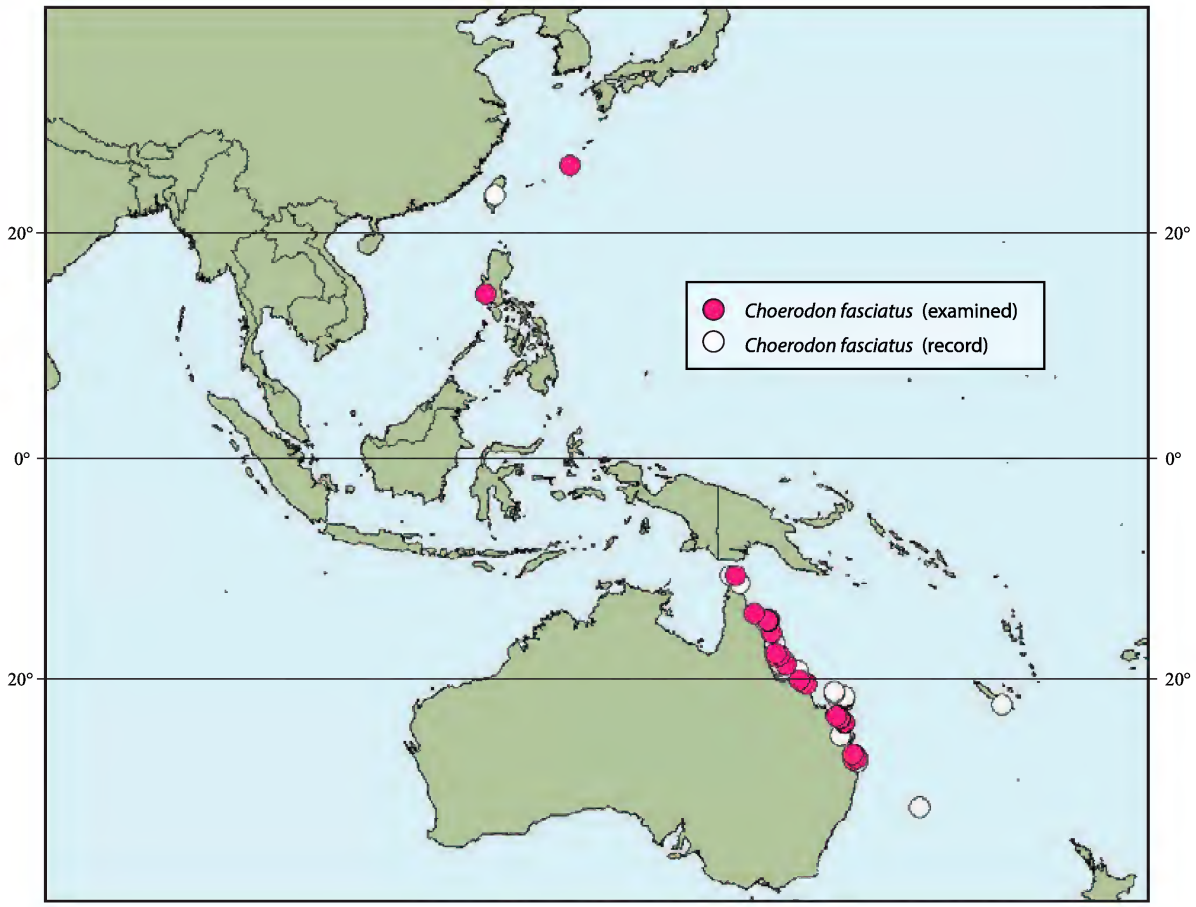

Figure 28. Distribution of *Choerodon fasciatus* based on specimens examined (coloured) and collection registration records (white).

Comments. Günther (1867: 101, pl. X) based his description of *Xiphochilus fasciatus* on two dried specimens (BPBM 1867.6.24.3, lectotype, 161 mm SL, and BPBM 1867.6.24.4, paralectotype, 143 mm SL) from Cape York, Australia. Snyder (1908: 96) was unlikely to have been familiar with Günther's species because he erred in the generic placement of his *Lepidaplois mirabilis* and the two descriptions are remarkably similar, at least with respect to colouration. The two would be distinct only if the Northern and Southern Hemisphere populations are found to be separate species. Genetic comparisons remain to be done. Similarly, Herre (1950: 149) must have been unfamiliar with the previous two descriptions because he, like the other authors, commented on "its brilliant colors and striking color pattern".

The prominent colouration described by the authors of the species and its synonyms is highly attractive to fish fanciers making it a popular aquarium species in the tropical marine aquarium trade. The distinctive pattern easily separates the species from congeners, although the more obscure banding in juveniles of a number of species and adults of *C. graphicus* are no doubt ancestral precursors. Donaldson (1995: 313) described the courtship and spawning of this species on the Great Barrier Reef, Queensland.

Material examined. 49 specimens, 31–188 mm SL ; see appendix

Choerodon (*Lutjanilabrus* nsubgen.)

Table 2

Diagnosis. Dorsal fin rays XIII, 7; anal fin rays III, 10; pectoral fin rays ii, 14, rarely 15, dorsalmost ray of moderate length 25.5–41.7% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular to broadly rounded; body moderately deep, 29.8–39.6% SL, caudal peduncle depth 12.0–14.9% SL, head depth 22.2–31.8% SL; head broadly pointed, dorsal profile of snout oblique, snout length 10.9–15.3% SL; predorsal scales approximately 12–15, reaching forward on dorsal midline to or almost to above middle of eye; cheek with small partially embedded scales in

about 8 diagonal rows, posteriormost with about 12 or 13 scales to upper extent of free preopercular edge, reaching forward almost to corner of upper lip crease above mouth, with broad naked margin posteriorly and ventrally on preopercle; about 2 rows of 10–12 small scales (2–4 scales in second row dorsally) on subopercle adjacent preopercular edge extending forward nearly to anterior end of ventral preopercular margin; each lateral line scale with multiple branching laterosensory canal tube; scales above lateral line about 4 or 5; few cephalic sensory canal pores confined to lines or short branches associated with major canals; second pair of canines in lower jaw directed dorsolaterally and curved posteriorly; dorsal and anal fins with very low basal sheath comprising 1 or 2 slightly smaller accessory scales at deepest; posterior lobe of dorsal and anal fins not reaching hypural crease; caudal fin truncate to slightly rounded. (See Table 2 for additional meristic and morphometric ranges.) Distinctive colouration with white head and body and prominent brown to black midlateral stripe from eye to base of tail at all sizes, although less distinct in largest individuals; smaller individuals with darkened circular to elongate spot superimposed on stripe on rear half of caudal peduncle.

Etymology. The group name *Lutjanilabrus* nsubgen is from the Malayan *ikan lutjang*, a vernacular for members of the snapper genus *Lutjanus* and *labrus*, apparently a Greek vernacular for wrasse, in reference to the snapper-like form of this monotypic subgenus of labrid.

Comments. Kuiter (2010: 62) placed *Choerodon vitta* in a separate unnamed subgenus based on its "unusual form, superficially like some members of Lutjanidae". The species was found by Puckridge *et al*. (2015: 67, fig. 1) to be a sister species of *Choerodon fasciatus* based on genetic evidence. These two species differ considerably from each other in overall form, dorsal and pectoral fin counts, caudal fin form, colouration and apparent habitat preference.

The body form of the sole representative of this subgenus (fig. 1, clade 4b) is far more symmetrical with a distinctly pointed head than in species of other subgenera, apart from the dwarf members of the subgenus *Peaolopesia*, which have a more slender appearance and blunter head.

Choerodon vitta Ogilby, 1910
Blackstripe Tuskfish

Figures 29, 30; table 2; appendix.

Choerodon vitta Ogilby, 1910a: 13, Aru Islands (Indonesia).

Diagnosis. Dorsal fin rays XIII, 7; anal fin rays III, 10; pectoral fin rays ii, 14, rarely 15, dorsalmost ray of moderate length 25.5–41.7% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular; body moderately deep, 29.8–39.6%SL, head depth 22.2–31.8% SL, caudal peduncle depth 12.0–14.9% SL; head broadly pointed, dorsal profile of snout oblique, snout length 10.9–15.3% SL; predorsal scales approximately 12–15, reaching forward on dorsal midline to or almost to above middle of eye; cheek with small partially embedded scales in about 8 diagonal rows, posteriormost with about 12 or 13 scales to upper extent of free preopercular edge, reaching forward almost to corner of upper lip crease above mouth, with broad naked margin posteriorly and ventrally on preopercle; about 2 rows of 10–12 small scales (2–4 scales in second row dorsally) on subopercle adjacent preopercular edge extending forward nearly to anterior end of ventral preopercular margin; each lateral line scale with mutlple branching laterosensory canal tube; scales above lateral line about 4 or 5; few cephalic sensory canal pores confined to lines or short branches associated with major canals; second pair of canines in lower jaw directed dorsolaterally and curved posteriorly; dorsal and anal fins with very low basal sheath comprising 1 or 2 slightly smaller accessory scales at deepest; posterior lobe of dorsal and anal fins not reaching hypural crease; caudal fin double emarginate, upper and lower corners rounded, posterior margin of fin concave, smoothly curved; pelvic fin reaching to or just short of anus, length 20.4–25.0% SL. (See Table 2 for additional meristic and morphometric ranges.) Brown to grey above, white below with dark midlateral stripe from eye to base of tail, usually followed by prominent darker spot.

Reaches moderately small maximum size, largest specimen examined 174 mm SL.

Pigmentation in alcohol. Juveniles pale with broad dark dusky lateral stripe from snout across lower half of eye to caudal fin base, intensified as elongate dark spot on rear half of caudal peduncle and caudal fin base (fig. 29A). Adults pale, slightly duskier dorsally with distinct dusky stripe on lateral midline continuing on head beneath eye and crossing snout in front of eye, ending posteriorly in distinct horizontally elongate spot on posterior half of caudal peduncle; fins mostly pale, dorsal fin slightly dusky anteriorly and basally.

Fresh colours. Juveniles white with grey dorsum and black midlateral stripe.

Adults grey dorsally, white ventrally with broad dark edged reddish brown stripe midlaterally from ventral half of eye to caudal peduncle followed by black elongate oval spot on caudal fin base (fig. 28B & C); head greenish grey above with yellow on cheeks and above midlateral stripe behind eye, with 2–4 anastomosing, silvery blue lines on cheek and preorbital. Dorsal and caudal fins grey; anal fin white. (Sainsbury & Kailola, 1984: 259, centre; Allen, 1985: 2407, fig. 333)

Etymology. The name *vitta* is Latin for "ribbon" or "stripe", in reference to the characteristic dark midlateral stripe on the side of this species.

Distribution. Confined to northern Australia and the Aru Islands in south-eastern Indonesia, reaching south to the Exmouth Gulf in Western Australia and to the southern part of the Great Barrier Reef on the east coast of Australia (fig. 30). Found on open sand or rubble bottom adjacent coastal reefs at depths of 4–75 m (Kuiter, 2010: 62; Allen & Erdmann, 2012: 648).

Comments. Ogilby (1910a: 13) described *Choerodon vitta* from a 190 mm TL specimen (QMB I.1555, 148 mm SL) collected at Dobo in the Aru Islands (Indonesia). The symmetrical, snapper-

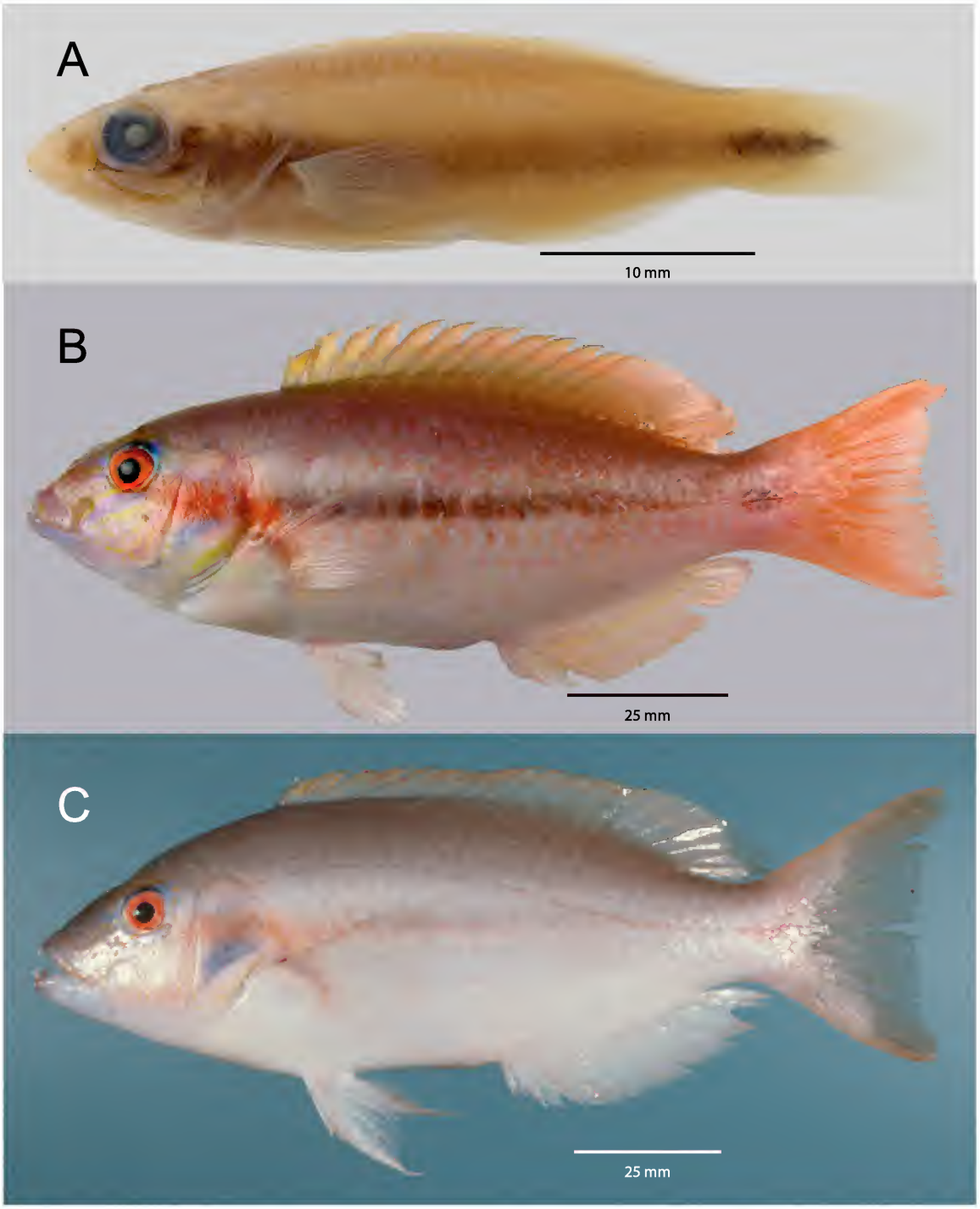

Figure 29. *Choerodon vitta*. A, Juvenile, AMS I. 18767-009, 33.9 mm SL, Queensland, Great Barrier Reef, Linnet Reef, 14° 47' S, 145° 20' E, preserved, photo by D. Paul, NMV; B, Initial phase adult, CSIRO H 6558-04, 107 mm SL, Torres Strait, north-west of Prince of Wales Island, Queensland, photo by D. Gledhill, CSIRO; C, Terminal phase adult, CSIRO CA 2163, 147 mm SL, Eighty Mile Beach, Western Australia, photo compliments of CSIRO.

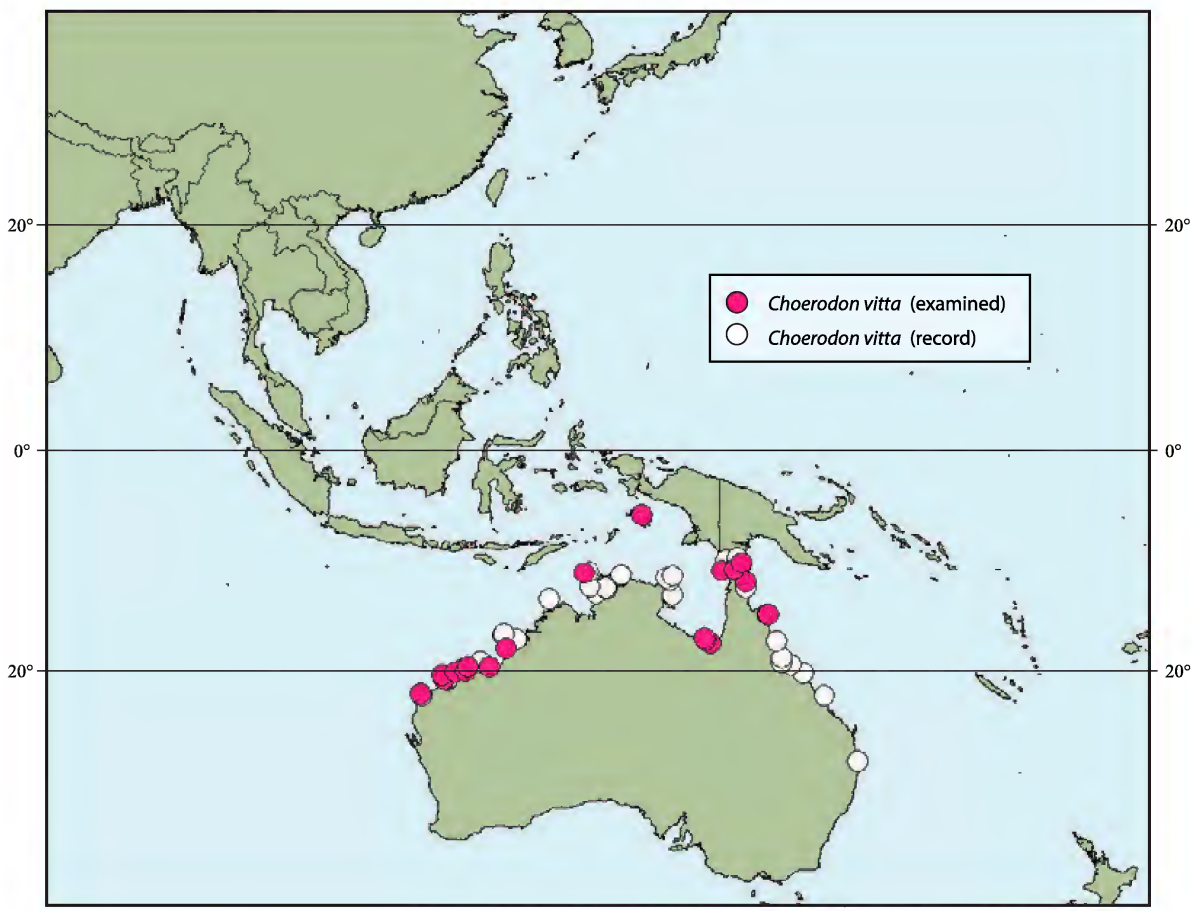

Figure 30. Distribution of *Choerodon vitta* based on collection examined (coloured) and collection registration records (white).

like form and dark brown to black midlateral stripe with black spot on the base of the caudal fin are diagnostic for the species.

Material examined. 40 specimens, 29.5–174 mm SL; see appendix.

Choerodon (*Xiphocheilus*) Bleeker, 1856

Table 2

Xiphocheilus Bleeker, 1856: 223 – *Xiphocheilos typus* Bleeker, 1856, by monotypy.

Diagnosis. Dorsal fin rays XII, 8; anal fin rays III, 10, rarely 9 or 11; pectoral fin rays ii, 14, rarely 12, 13 or 16, dorsalmost ray of moderate length 24.6–33.8% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular; body shallow, 24.6–33.7% SL, head depth 21.8–25.5% SL, caudal peduncle depth 12.8–14.2% SL; head blunt, dorsal profile of snout steep, snout snout length 8.3–9.8% SL; predorsal scales approximately 7–10, reaching forward on dorsal midline to or slightly in advance of above centre of eye; cheek covered by large imbricate scales in about 3 nearly vertical rows, posteriormost with about 6 scales to upper extent of free preopercular edge, reaching forward in advance of corner of upper lip crease above mouth, below posterior half of eye, with narrow naked margin posteriorly and ventrally on preopercle; about 5 large scales covering subopercle forward to about anterior end of ventral preopercular margin; each lateral line scale with multiple branching laterosensory canal tube; scales above lateral line about 2 or 2½; cephalic sensory canal pores numerous but confined to lines or short branches associated with major canals; second pair of canines in lower jaw directed anterodorsally and slightly laterally; dorsal and anal fins without basal sheath, 1–3 progressively smaller accessory scales adjacent to fin base; posterior lobe of dorsal and anal fins barely reaching hypural crease at most; caudal fin truncate to slightly rounded, upper corner slightly produced in largest individuals; pelvic fin reaching well short of anus in small individuals, to anus in largest, length 18.5–26.1% SL.

(See Table 2 for additional meristic and morphometric ranges.) Olive above, somewhat orange to pink below, with black bar between lateral line and base of middle dorsal fin spine; numerous posteroventrally angled oblique yellow-edged blue lines on side; additional, anteroverntrally angled lines on head.

Reaches small maximum size, largest specimen examined 110 mm SL.

Comments. The name *Xiphocheilus* has appeared under several spellings, including within Bleeker's (1856: 223) initial description of the genus and the accompanying description of the type species *Xiphoceilos typus* Bleeker (1856: 224). The latter is regarded as a typographical error. Subsequent referral of species to the nominal genus by Günther introduced the spelling *Xiphochilus* (Günther, 1861, 1862, 1867, 1880; Playfair & Günther, 1866). In more recent years, regarded as a valid genus, the generic boundary of the taxon was much less clear in the years following its proposal, as Günther alone referred species in four of the six subgenera of *Choerodon* recognised here to it. Gomon (1997: 861) acknowledged that *Xiphocheilus* has characters consistent with species of *Choerodon* but hypothesised it diverged prior to species within that genus primarily based on patterns of head squamation. Puckeridge *et al*. (2015: fig. 1) found it to be sister to a clade within *Choerodon* corresponding to the subgenus *Choerodon* (*Pealopesia*). Based on genetic evidence inferring interrelationships, reduction or expansion of head squamation is likely not to have been unidirectional within the complex or reduction has occurred independently on more than one occasion. The sister relationship of *C. typus* with the complex of species constituting *C. (Peaolopesia)* hypothesised is supported by the shared small maximum size attained but larger first pectoral fin ray present in *C. typus* that approaches the condition in other subgenera. *Choerodon (Xiphocheilus)* is therefore recognised as a monotypic subgenus (fig. 1, clade 1b).

Choerodon typus (Bleeker, 1856)
Bluetooth Tuskfish

Figures 31,32; table 2; appendix.

Xiphocheilos typus Bleeker, 1856: 224, Nias.
Xiphochilus quadrimaculatus Günther, 1880: 45, pl. XX, fig. c, Arafura Sea.

Diagnosis. Dorsal fin rays XII, 8; anal fin rays III, 10, rarely 9 or 11; pectoral fin rays ii, 14, rarely 12, 13 or 16, dorsalmost ray of moderate length 24.6–33.8% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular; body shallow, 24.6–31.5% SL, head depth 22.1–26.9% SL, caudal peduncle depth 12.7–15.2% SL; head blunt, dorsal profile of snout steep, snout snout length 7.9–9.8% SL; predorsal scales approximately 7–10, reaching forward on dorsal midline to or slightly in advance of above centre of eye; cheek covered by large imbricate scales in about 3 nearly vertical rows, posteriormost with about 6 scales to upper extent of free preopercular edge, reaching forward in advance of corner of upper lip crease above mouth, below posterior half of eye, with narrow naked margin posteriorly and ventrally on preopercle; about 5 large scales covering subopercle forward to about anterior end of ventral preopercular margin; each lateral line scale with multiple branching laterosensory canal tube; scales above lateral line about 2 or 2½; cephalic sensory canal pores numerous but confined to lines or short branches associated with major canals; second pair of canines in lower jaw directed anterodorsally and slightly laterally; dorsal and anal fins without basal sheath, 1–3 progressively smaller accessory scales adjacent to fin base; posterior lobe of dorsal and anal fins barely reaching hypural crease at most; caudal fin truncate to slightly rounded, upper corner slightly produced in largest individuals; pelvic fin reaching well short of anus in small individuals, just beyond anus in largest, length 18.5–26.5% SL. (See Table 2 for additional meristic and morphometric ranges.) Olive above, somewhat orange to pink below, with black bar between lateral line and base of middle dorsal fin spine; numerous posteroventrally angled oblique yellow-edged blue lines on side; additional, anteroverntrally angled lines on head.

Reaches small maximum size, largest specimen examined 123 mm SL.

Pigmentation in alcohol. Juvenile patterns unclear. Adults pale, slightly duskier above with dusky horizontal stripe above lateral midline from above pectoral fin base to hypural crease and vertical dusky mark above lateral line below central dorsal fin spines; pectoral fin base dusky darkest along proximal ends of rays dorsally; head with diffuse dusky blotch on opercle and underlying blue bones faintly evident. Dorsal, anal, pectoral and pelvic fins pale, anal with broad dusky distal stripe; caudal fin pale, broadly blue basally and with broad dark dusky marginal band on lower half of fin.

Fresh colours. Olivaceous above, somewhat orange or pink below (fig. 31); broad black short band dorsally on side below about 6th dorsal fin spine; numerous narrow evenly spaced posteroventrally angled, oblique pale blue bands outlined with yellowish orange on side; head with additional bands, first 2 directed anteroventrally from eye, third anoteroventrally from origin of lateral line across cheek to corner of mouth, remaining 1 or 2 on head vertically adjacent to posterior edge of preopercle. Dorsal fin blue with 2 or 3 narrow yellowish orange or pink stripes; anal fin yellowish orange with numerous narrow blue bands basally; caudal fin yellowish orange with about 5–8 narrow blue bands; fin suffused with black centrally. Pectoral fin transparent to orange with blue band edged with black posteriorly on fleshy fin base; pelvic fin yellowish orange with blue leading edge (Sainsbury & Kailola, 1984: 261, bottom; Kuiter, 2010: 66, figs A–C; Allen & Erdmann, 2012: 726).

Etymology. The name *typus* is from the Greek *typos* for "figure or mark", most likely a reference to the black band dorsally on the side below the central dorsal fin spines.

Distribution. Occurs in the tropical western Pacific Ocean from at least Taiwan to the Gulf of Carpentaria, extending into the north-eastern Indian Ocean westward to about Madras, India (fig. 32). Lives over sand or rubble bottom at depths of 15–60 m, occasionally near reefs (Allen & Erdmann, 2012).

Figure 31. *Choerodon typus*. Initial phase adult, USNM 424685, 105 mm SL, Pasil market, Cebu, Philippines, photo by J. Williams, USNM.

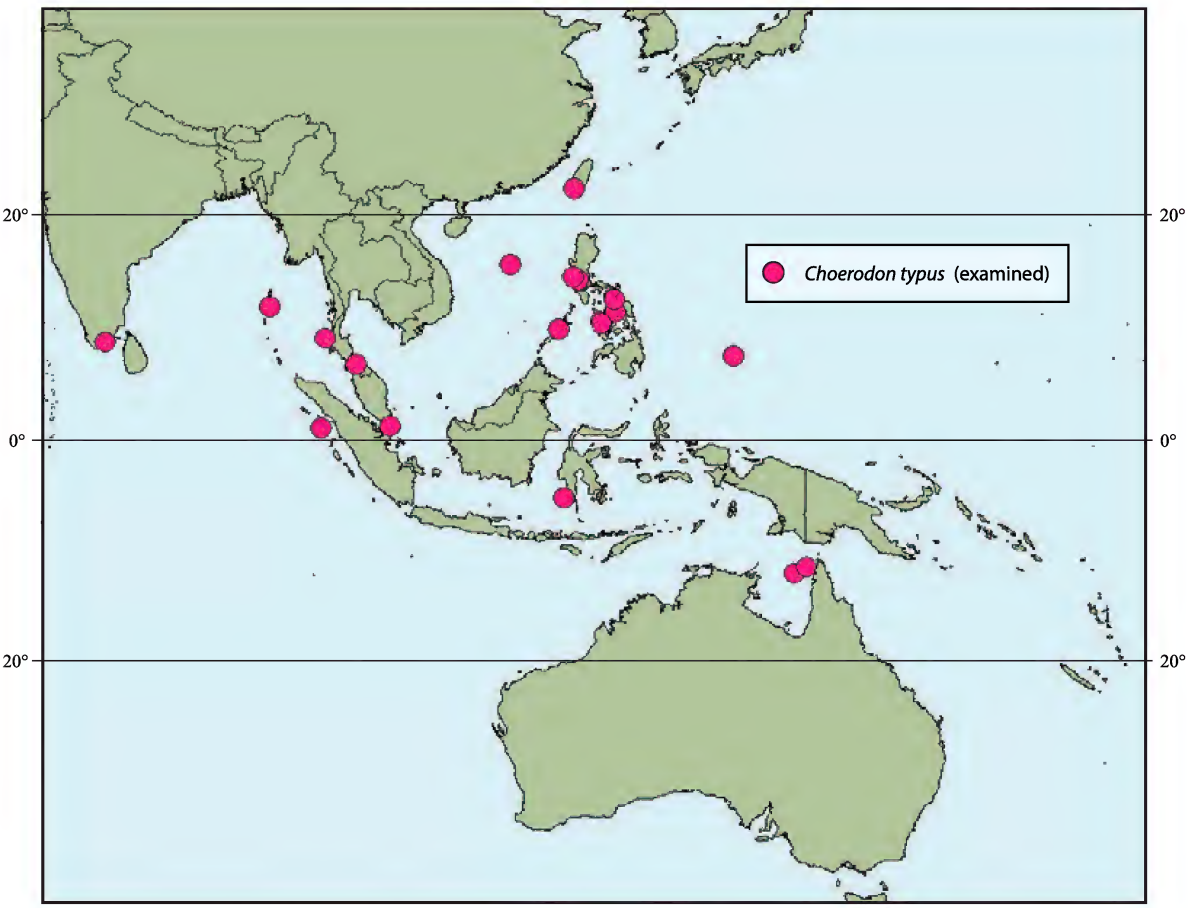

Figure 32. Distribution of *Choerodon typus* based on specimens examined.

Comments. Bleeker (1856: 223–224) described his new genus and species *X. typus* in considerable detail from a 128''' (102 mm SL) specimen collected off the island of Nias on the western coast of Sumatra, Indonesia, and now lodged in the Natural History Museum (BMNH 1864.5.15.35). Günther (1880: 45) presented his description of his *Xiphochilus quadrimaculatus* in much less detail and failed to compare it with previous species referred to the genus. His type specimen (BMNH 1879.5.14.34) from the Arafura Sea is smaller than Bleeker's type but clearly an example of the same species.

As discussed above, *C. typus* most closedly resembles slender species of the subgenus *Choerodon* (*Pealopesia*) (fig. 1, clade 1a), differing from them in having a longer first pectoral fin ray equal to 24.6–33.8% (versus 2.8–17.5%) of the pectoral fin length, 7–10 predorsal scales reaching forward on the dorsal midline to or slightly in advance of above the centre of the eye, in contrast to 5–8 scales reaching forward no farther than above the posterior extent of the eye and its cheek covered by large imbricate scales rather than small, partially or almost completely embedded scales extending over far less of the cheek. *Choerodon typus* is recognised here as a monotypic subgenus (fig. 1, clade 1b) based on these considerable morphological differences.

Material examined. 45 specimens, 38.6–123 mm SL; see appendix.

Choerodon (*Peaolopesia*) Smith, 1953

Tables 2, 5, 6

Peaolopesia Smith, 1953: 520, type species – *Xiphochilus gymnogenys* Playfair & Günther, by monotypy.

Choerodonoides Kamohara, 1958: 2, type species – *Choerodonoides japonicus* Kamohara (= *C. albofasciatus*), by monotypy.

Diagnosis. Dorsal fin rays XII, 8 or XIII, 7; anal fin rays III, 10; pectoral fin rays ii, 13–14, rarely 14, dorsalmost ray short 2.8–17.5% pectoral fin length; ventralmost pectoral fin ray distinctly longer than those immediately above, posterior edge of fin falcate, dorsoposterior corner bluntly pointed and posteroventral corner sharply pointed or ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed and posteroventral corner angular to broadly rounded; body moderately shallow, 24.4–37.7% SL, caudal peduncle depth 9.2–13.3% SL, head depth 19.4–29.22% SL; head blunt, dorsal profile of snout steep, snout length 8.0–15.5% SL; predorsal scales approximately 5–8, reaching forward on dorsal midline almost to above posterior edge of preopercle, to above posterior extent of eye or somewhere between; cheek with small partially or almost completely embedded scales in about 2–10 diagonal rows, posteriormost with about 2–10 scales to upper extent of free preopercular edge, reaching forward approaching upper lip crease above mouth, not reaching much below lower margin of eye and posterior extent of orbit, or reaching somewhere between, with broad naked margin posteriorly and ventrally on preopercle or almost completely naked cheek; 1–3 rows (only about 2 scales in second row when present) of small scales on subopercle adjacent preopercular edge extending forward to about anterior end of ventral preopercular margin, to just in advance of posteroventral corner of preopercular margin, or somewhere between, with about 5–10 scales in outermost row; each lateral line scale with unbranched to multiple branching laterosensory canal tube; scales above lateral line about 2½–3½; cephalic sensory canal pores relatively few confined to lines or short branches associated with major canals, extremely numerous on top of head, in front of and below eye and on lower jaw, or arranged somewhere between; second pair of canines in lower jaw directed anterodorsally and slightly laterally, usually curved slightly posteriorly; dorsal and anal fins with or without very low basal sheath, comprising 1 smaller scale with 1–3 smaller or progressively smaller accessory scales adjacent to fin base; posterior lobe of dorsal and anal fins reaching well short of, not quite to or to hypural crease; caudal fin margin truncate to convex. (See Table 2 for additional meristic and morphometric ranges.) Most with prominent white to pearlescent stripe or enlarged spot on body of adults, with or without distinctive sexual dimorphism. Colouration of juveniles of some unknown.

Comments. Smith published *Peaolopesia* as a *nomen nudum* first in a figure caption of a plate of illustrations (1949: pl. 101, fig. 776a; 1950: pl. 101, fig. 776a), evidently added immediately prior to publication, and for which no species treatments were provided. In the third edition of *Sea Fishes of Southern Africa* (1953: 520), Smith elaborated, designating *Xiphochilus gymnogenys* Playfair and Günther, 1867 as type species. Debate continued as to whether it and closely allied species, such as *Choerodon margaritiferus* Fowler and Bean, 1928, formed a natural grouping deserving generic recognition distinct from *Choerodon*. Kamohara (1958: 2) faced the same dilemma when describing his *Choerodonoides japonicus* and was undoubtedly unaware of Smith's name. Gomon (1997: 812) placed the two in synonymy with *Choerodon* but acknowledged that they represented a natural grouping that might be recognised in the future at subgeneric level.

The subgenus (fig. 1, clade 1a) comprises ten species with a relatively slender profile and very short first pectoral fin ray, seven of which have a modified falcate pectoral fin with an extended ventralmost fin ray. The rather wide range of proportional lengths for the first pectoral fin ray provided in the above description and in Tables 2, 6 and 7 is more reflective of the difficulty in determining where the distal tip is positioned beneath overlying epidermal tissue than any true variations in length. All species reach a small maximum size as adults; the smallest *C. gomoni* is so far known from individuals measuring 106 mm SL or less, and the largest *C. aurulentus* sp. nov. attains only just more than 180 mm SL. Elsewhere within the genus, only *C. typus* of the monotypic subgenus *Xiphocheilus* has a maximum length falling within this range. The subgenus may be legitimately regarded as dwarf tuskfishes.

Choerodon albofasciatus nom. nov.
Ira-modoki, Whitestripe Tuskfish

Figures 33, 34; table 5; appendix.

Choerodonoides japonicus Kamohara, 1958: 2, pl. 1, fig. 1, Mimase Market, Kochi City (Japan), junior homonym of *Labrus japonicus* Valenciennes (= *C. azurio*).

Table 5. Ranges for selected counts and proporional measurements in eight species of the subgenus *Peaolopesia*. "N" designates number of counts or measurements. Aberrant values enclosed by parentheses.

Species	*C. albofasciatus*		*C. frenatus*		*C. gomoni*		*C. gymnogenys*		*C. jordani*		*C. margaritiferus*		*C. sugillatum*		*C zosterophorus*	
MERISTIC FEATURES		**N**		**N**		**N**		**N**		**N**		**N**		**N**		**N**
Dorsal fin	XII, 8 (XI, 9)	12	XIII, 7	11	XII, 8	10	XII, 8	11	XIII, 7	13	XII, 8	10	XII, 8	30	XIII, 7	9
Anal fin	III, 10 (8)	12	III, 10	11	III, 10 (9)	10	III, 10	11	III, 10	13	III, 10	10	III, 10	30	III, 10	9
Pectoral fin	ii, 13 (12)	22	ii, 13 (14)	22	ii, 13	22	ii, 13 (14)	13	ii, 13	22	ii, 13 (14)	11	ii, 13 (14)	58	ii, 13	18
Vertebrae	10+17 = 27	10	10+17 = 27	10	10+17 = 27	10	10+17 = 27	10	10+17(16) = 27(26)	13	10+17 = 27	10	10+17 = 27	28	10+17 = 27	8
MORPHOMETRIC FEATURES																
Standard length (mm)	96.7–152		88.5–136		71.5–106		99.5–140		72.2–139		82.8–115		64.2–145		44.7–153	
% SL	**range**	**mean N**	**range**	**mean N**	**range**	**mean N**	**range**	**mean N**	**range**	**mean N**	**range**	**mean N**	**range**	**mean N**	**range**	**mean N**
Body depth	27.8–32.5	30.6 10	27.1–30.5	29.2 12	24.4–28.6	27.1 11	29.3–32.0	30.7 10	29.8–33.0	31.4 14	24.7–30.8	26.9 10	29.3–37.7	32.1 31	29.4–32.9	31.5 9
Caudal peduncle depth	10.8–11.6	11.1 10	11.7–13.3	12.3 12	9.2–10.3	9.8 11	10.0–11.4	10.4 10	11.7–13.1	12.4 13	9.4–10.5	9.8 10	10.0–12.8	11.2 10	11.8–13.6	12.7 9
Head length	36.4–41.5	39.2 10	34.8–38.8	36.7 12	38.8–43.0	40.1 11	36.9–41.9	39.6 11	34.6–39.4	36.5 16	35.3–40.6	38.4 10	33.3–39.7	35.5 31	33.9–36.4	35.2 9
Head depth	21.2–25.5	24.2 10	21.8–25.6	23.4 10	20.1–24.6	22.5 11	24.0–27.3	25.8 9	22.1–28.1	24.3 16	19.4–25.2	21.3 10	21.5–29.2	24.7 10	19.8–27.0	24.4 8
Orbit diameter	7.7–9.7	8.6 10	7.1–9.7	8.3 12	8.7–9.9	9.4 11	6.9–8.2	7.5 10	7.7–9.3	8.5 14	7.4–8.6	8.1 10	6.0–9.7	7.9 31	7.1–10.4	8.2 9
Interorbital width	7.6–9.7	8.6 10	7.0–8.2	7.5 10	7.8–8.9	8.4 11	6.0–7.4	6.8 10	8.1–10.5	8.9 13	7.7–11.3	9.8 10	6.0–7.6	6.7 10	8.1–9.9	8.9 9
Snout length	9.9–13.1	11.7 10	11.6–14.3	12.5 12	9.4–11.9	10.7 11	12.2–15.5	13.6 10	9.8–12.5	11.1 13	9.4–12.1	10.8 10	8.0–10.6	9.1 10	9.5–11.6	10.5 8
Dorsal fin base length	51.4–56.1	53.6 10	49.0–58.0	53.2 12	47.0–54.1	50.4 11	49.4–54.9	52.3 10	51.2–58.1	53.8 13	49.5–54.7	51.6 10	52.7–56.5	54.8 10	51.2–57.7	53.3 9
Dorsal fin last spine length	7.7–11.4	9.3 10	8.4–11.2	9.8 10	7.1–9.0	8.3 11	7.0–9.0	7.9 10	8.7–11.7	10.3 13	7.6–10.4	9.2 10	5.5–9.9	8.2 10	8.7–12.2	11.1 9
Dorsal fin posterior lobe length	8.9–11.0	10.0 10	11.2–13.9	13.0 10	8.0–9.7	9.0 10	7.6–9.5	8.8 9	8.8–12.9	10.7 15	7.9–9.3	8.6 10	6.4–11.8	10.3 10	7.7–12.0	10.3 9
Anal fin base length	22.6–28.9	25.4 10	22.2–27.5	24.9 12	22.7–25.9	23.8 11	22.9–27.2	25.1 10	23.5–27.8	25.8 13	21.1–25.1	23.2 10	22.8–27.3	24.9 10	22.7–27.0	25.2 9
Anal fin posterior lobe length	8.7–10.6	10.1 10	10.8–12.5	11.4 10	7.7–9.2	8.7 11	8.5–10.8	9.8 9	9.5–12.2	11.0 15	7.2–11.7	9.1 10	5.5–9.9	8.2 10	7.4–12.7	10.7 9
Pectoral fin length	22.2–26.2	23.6 10	22.9–28.2	24.6 12	20.8–25.4	23.5 11	19.4–24.6	22.2 11	24.8–29.4	27.1 14	21.5–24.7	23.2 10	6.4–11.8	10.3 10	23.7–26.1	24.8 9
1st pectoral fin ray length	1.8–3.2	2.5 10	1.7–4.0	2.8 10	1.9–4.1	2.8 11	1.2–2.9	2.3 8	2.4–5.1	3.6 14	1.8–2.9	2.3 10	22.8–27.3	24.9 10	2.8–4.6	3.4 4
Pelvic fin length	21.4–24.8	23.0 10	20.1–23.4	21.7 12	19.1–22.9	21.1 11	21.3–26.1	23.6 9	19.5–27.3	22.8 13	19.0–21.3	20.1 10	5.5–9.9	8.2 10	19.8–22.4	21.6 9
Caudal fin dorsal lobe length	19.9–25.5	22.3 10	16.2–19.5	17.8 6	18.5–22.8	20.5 11	16.4–21.5	19.5 4	20.8–23.4	22.4 13	19.9–21.8	20.8 9	6.4–11.8	10.3 10	23.8–26.0	24.9 4
Caudal fin central ray length	18.3–24.8	20.1 10	17.0–21.9	19.1 10	15.9–21.3	18.6 11	15.9–20.6	17.8 10	17.5–21.9	20.3 13	17.0–21.3	19.5 10	22.8–27.3	24.9 10	18.4–21.8	20.2 9

Table 5 (cont.). Ranges for selected counts and proporional measurements in eight species of the subgenus *Peaolopesia*. "N" designates number of counts or measurements. Aberrant values enclosed by parentheses.

Species	*C. albofasciatus*	*C. frenatus*	*C. gomoni*	*C. gymnogenys*	*C. jordani*	*C. margaritiferus*	*C. sugillatum*	*C zosterophorus*
MORPHOMETRIC FEATURES								
Head length (mm)	37.3–60.2	34.3–50.2	28.7–41.9	39.4–56.9	25.8–49.2	29.2–44.1	22.0–52.7	16.1–54.1
% HL	**range mean N**	**range mean N**	**range mean N**	**range mean N**	**range mean N**	**range mean N**	**range mean N**	**range mean N**
Head depth	57.7–65.3 61.6 10	56.6–72.1 64.0 10	52.0–60.5 56.2 11	59.1–70.6 64.4 9	25.8–50.0 39.2 16	51.5–67.0 55.5 10	62.8–83.7 71.2 10	55.0–88.5 71.4 8
Orbit diameter	19.1–25.7 21.9 10	19.1–25.1 22.5 12	21.6–25.0 23.4 11	17.3–21.1 18.8 10	61.7–81.8 67.1 16	19.6–23.4 21.2 10	17.4–28.2 22.3 31	20.2–29.8 23.7 9
Interorbital width	19.9–23.8 21.9 10	18.0–23.0 20.6 10	19.5–22.7 21.0 11	15.3–18.3 17.0 10	20.9–26.1 23.5 14	20.0–27.8 25.6 10	17.0–21.8 19.2 10	22.7–30.7 26.0 9
Snout length	25.6–33.2 29.9 10	31.2–38.6 34.0 12	23.5–28.7 26.6 11	30.8–38.1 34.2 10	22.6–27.2 24.5 13	23.1–30.3 28.2 10	23.9–29.1 26.2 10	26.8–37.2 30.7 8
x 100%								
1st pectoral fin ray/pectoral fin length	7.2–13.1 10.6 10	6.7–16.8 11.4 10	8.3–16.4 11.9 11	5.2–13.9 10.2 8	9.6–17.5 13.4 13	7.3–12.9 9.9 10	2.8–11.7 7.3 11	11.3–18.3 13.9 4
Orbit diameter/Snout length	64.2–91.8 73.8 10	49.5–76.2 66.5 12	80.1–104 88.5 11	46.1–67.4 55.3 10	65.8–93.9 77.7 13	66.4–89.5 75.7 10	65.2–102 80.0 10	63.3–105 75.9 8

Table 6. Ranges for selected counts and proportional measurements for types of two new species of the subgenus *Peaolopesia*. "N" designates number of counts or measurements.

Species	*C. aurulentus nsp*		*C. skaiopygmaeus nsp*			
MERISTIC FEATURES	**Holotype**	**Paratype**	**Holotype**	**Paratypes**		**N**
Dorsal fin	XII, 8	XII, 8	XIII, 7	XIII, 7		6
Anal fin	III, 10	III, 10	III, 10	III, 10		6
Pectoral fin	ii, 13	ii, 13	ii, 13	ii, 13		12
Vertebrae	10+ 17 = 27	10+ 17 = 27	10+ 17 = 27	10+ 17 = 27		6
MORPHOMETRIC FEATURES				**range**	**mean**	**N**
Standard length (mm)	181	177	138	75.6 – 133	100.4	6
% SL						
Body depth	29.3	29.5	34.3	31.0– 33.1	31.6	6
Caudal peduncle depth	11.4	10.6	12.1	11.7– 13.0	12.2	6
Head length	38.2	36.6	42.0	38.0– 41.4	39.9	6
Head depth	25.0	24.6	26.2	24.3– 28.5	25.9	6
Orbit diameter	7.4	7.1	7.4	7.6– 9.0	8.4	6
Interorbital width	8.4	8.4	7.9	6.6– 8.1	7.2	6
Snout length	12.0	12.2	13.1	10.3– 13.0	11.5	6
Dorsal fin base length	53.6	56.4	55.0	50.7– 53.9	52.1	6
Dorsal fin last spine length	9.5	8.8	7.7	7.1– 9.4	8.0	6
Dorsal fin posterior lobe length	11.8	11.4	9.5	7.6– 10.1	9.1	6
Anal fin base length	26.7	26.9	26.9	25.7– 29.3	27.1	6
Anal fin posterior lobe length	12.4	12.6	8.6	9.2– 13.0	10.3	6
Pectoral fin length	23.3	23.4	24.6	23.8– 26.3	25.1	6
1st pectoral fin ray length	1.6	2.1	2.7	2.4– 3.8	3.1	6
Pelvic fin length	24.6	25.8	22.8	19.6– 22.8	21.5	6
Caudal fin dorsal lobe length	21.8	21.5	20.4	18.7– 20.8	19.6	5
Caudal fin central ray length	17.1	18.9	17.7	17.4– 23.0	20.7	6
Head length (mm)	69.1	64.7	57.9	31.3– 53.3	40.0	6
% HL						
Head depth	65.6	67.2	62.3	58.6– 70.9	65.0	6
Orbit diameter	19.3	19.4	17.7	19.0– 22.6	21.1	6
Interorbital width	22.0	22.9	18.9	16.3– 19.6	18.2	6
Snout length	31.4	33.3	31.2	27.2– 32.2	28.9	6
x 100%						
1st pectoral fin ray/pectoral fin length	7.0	9.1	11.2	9.5– 14.1	12.0	5
Orbit diameter/Snout length	61.4	58.2	56.6	58.9– 83.1	73.6	6

Peaolopesia gymnogenys (not Günther). — Masuda *et al.*, 1975: 294; Masuda *et al.*, 1984: 202, Okamura and Amaoka, 1997: 519; Nakabo, 2000: 969.

Choerodon gymnogenys (not Günther). — Shen, 1993: 452; Chen, 2010: 384.

Choerodon japoncus. — Kuiter, 2010: 63; Nakabo, 2013: 1088.

Choerodon cf margaritiferus. — White *et al.*, 2013: 265; Puckridge *et al.*, 2015: 65, 66, figs 1 & 2.

Diagnosis. Dorsal fin rays XII, 8 (rarely XI, 9); anal fin rays III, 10 (rarely 8); pectoral fin rays ii, 13 (rarely 12), dorsalmost ray short 7.2–13.1% pectoral fin length, ventralmost ray distinctly longer than those immediately above, posterior edge of fin falcate, dorsoposterior corner bluntly pointed, posteroventral corner sharply pointed; body shallow, 27.8–32.5% SL, head depth 21.2–25.5% SL, caudal peduncle depth 10.8–11.6% SL; head blunt, dorsal profile of snout steep, snout length 9.9–13.1% SL; predorsal scales approximately 7, reaching forward on dorsal midline to or just in advance of posterior edge of preopercle; cheek with small partially embedded scales in about 4 or 5 diagonal rows, posteriormost with about 8–10 scales to upper extent of free preopercular edge, reaching forward almost to corner of upper lip crease above mouth, with very broad naked margin posteriorly and ventrally on preopercle; row of about 8–10 small scales on subopercle adjacent preopercular edge extending forward to about anterior end of ventral preopercular margin; each lateral line scale with unbranched laterosensory canal tube; cephalic sensory canal pores moderately numerous confined to lines or short branches associated with major canals; scales above lateral line about 2½ or 3; second pair of canines in lower jaw directed laterally, recurved posteriorly; dorsal and anal fins without basal sheath, additional small scale at top of some oblique rows; posterior lobe of dorsal and anal fins reaching well short of hypural crease; caudal fin truncate, with posterior margin slightly convex medially, upper and lower corners slightly pointed; pelvic fin reaching to anus, length 21.4–24.8% SL. (See Table 5 for additional meristic and morphometric ranges.) Red to green above, white below with with pearly blue midlateral stripe angled from underside of eye to base of caudal fin, stripe deflected downward to upper jaw below front of eye; terminal phase with second narrower stripe from back of eye along lateral line to top of caudal peduncle; scales posteroventrally with vertical pearly blue line.

Reaches moderately small maximum size, largest specimen examined 152 mm SL.

Pigmentation in alcohol. Juveniles unknown. Adults pale with moderately narrow tapering dark stripe directed posteriorly and slightly dorsally from centre of posterior margin of orbit towards posterior end of dorsal fin base, terminating slightly below last few rays; similar stripe directed from lower extent of orbit to just above centre of caudal fin base; space between stripes dark dusky tapering to point adjacent termination of ventral stripe; fins pale.

Fresh colours. Juveniles unknown. Initial phase adults reddish orange above, white below, with broad white stripe running from tip of snout under eye and angled slightly dorsally to caudal fin base above lateral midline, stripe with distinct red margin from lower edge of eye to caudal base dorsally and from opercle to caudal base ventrally (fig. 33A); scales below stripe on sides blotched with red to level of lower end of pectoral fin base; head with white cheeks and red lips. Dorsal fin yellow with hyaline submarginal stripe; anal fin hyaline with broad yellow midlateral stripe; caudal fin mostly yellow. Pectoral and pelvic fins hyaline; pelvic fin with lengthwise yellow submarginal line near leading edge (Masuda *et al.*, 1984: pl. 193, fig. B; Okamura & Amaoka, 1997: 519, fig. 1, as *Paeolopesia gymnogenys*; White *et al.*, 2013: 265, fig. 89.14, as *Choerodon* cf. *margaritiferus*).

Terminal phase adults green above, yellow reticulation midlaterally and white ventrally, each scale on side with vertical pearly line (fig. 33B); broad pale blue stripe from lower margin of eye above pectoral fin base to just above centre of caudal fin base; second narrower blue stripe from posterior margin of eye curving ventrally to join first below middle of soft portion of dorsal fin; head with yellow stripe from upper jaw to anteroventral margin of eye; second curving from posterior end of upper jaw across operculum and along pectoral fin base; space between yellow stripes pale blue. Dorsal fin pale pinkish brown with narrow yellow submarginal stripe; anal fin white with narrow yellow medial stripe; caudal fin blue basally, posterior half red. Pectoral fin red; pelvic fin white with lengthwise yellow submarginal line near leading edge (Masuda *et al.*, 1984: pl. 193, fig. A; Shen, 1993: pl. 144, fig. 3, as *C. gymnogenys*; Chen *et al.*, 2010: 384, fig. C).

Etymology. The name *albofasciata* is from the Latin *albo* for "white" and *fasciatus* meaning "envelope with bands", in reference to the prominent white stripe on the side as part of the initial phase colouration of this species.

Distribution. Occurs along the western edge of the Pacific from Inami, on the south-eastern coast of Honshu Island in Japan to Shark Bay, Western Australia (fig. 34) at depths of at least 95–120 m.

Comments. Kamohara's *Choerodonoides japonicus* (1958: 2, pl. 1, fig. 1) is clearly a species of *Choerodon* (Gomon, 1997: 812) and therefore a junior homonym of *Labrus japonicus* Valenciennes, in Cuvier & Valenciennes, 1839 (= *Choeodon japonicus*), itself a homonym of *Labrus japonicus* Houttuyn, 1782. The species therefore requires a new name and *C. albofasciatus* is proposed as a replacement.

The species has been treated variously in the literature, as cited in the synonomy above, and therefore confused with *C. gymnogenys* and *C. margaritiferus*, with which it shares the white to pearly lateral stripe or pair of stripes. The same basic pattern occurs in *C. gomoni* as well as *C. auruilentus* described below. *Choerodon albofasciatus* differs from all four in having its cheek scales extending forward to the anterior end of the exposed ventral edge of the preopercle versus to or less than to the middle of the preopercular edge.

Material examined. 11 specimens, 96.7–152 mm SL; see appendix.

Figure 33. *Choerodon albofasciatus* nom. nov. A, Initial phase adult, CSIRO H 7220-04, 136 mm SL, Lombok, Tanjung Luar, photo by W. White, CSIRO; B, Terminal phase adult, north of Bonaparte Archipelago, Western Australia, photo compliments of CSIRO.

Choerodon aurulentus sp. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:CB22CDB8-2FC7-4417-8FA9-ABAD417033D6

Proposed vernacular: Gilded Tuskfish

Figures 34, 35; table 6

Holotype. NSMT-P 122933 (181) western South Pacific, New Zealand, Norfolk Ridge, 29° 28.8' S, 168° 10.6' E, 90 m, 17 January 1976, RV Kaiyo-maru (orig. no. ED166).

Paratype. (1 specimen, 177 mm SL). NSMT-P 122932 (177) western South Pacific, New Zealand, Norfolk Ridge, 28° 44.4' S, 167° 55' E, 79 m, 18 January 1976, RV Kaiyo-maru (orig. no. EC301).

Diagnosis. Dorsal fin rays XII, 8; anal fin rays III, 10; pectoral fin rays ii, 13, dorsalmost ray very short 7.0–9.1% pectoral fin length, ventralmost ray distinctly longer than those immediately above, posterior edge of fin falcate, dorsoposterior corner bluntly pointed, posteroventral corner sharply pointed; body shallow, 10.6–11.4% SL, head depth 24.6–25.0% SL, caudal peduncle depth 10.6–11.4% SL; head blunt, dorsal profile of snout steeply rounded, snout length 12.0–12.2% SL; predorsal scales approximately 7, reaching forward on dorsal midline just in advance of posterior edge of preopercle; cheek with small partially embedded scales in about four diagonal rows, posteriormost with about 7 scales to upper extent of free preopercular edge, scales not reaching forward quite to below centre of eye, lower third or more of cheek above ventral edge of preopercle naked; 1 or 2 rows of about 7 or 8 small scales on subopercle adjacent preopercular edge extending forward to just more than half way to anterior extent of free ventral preopercular edge; each lateral line scale with unbranched laterosensory canal tube; cephalic sensory canal pores moderately numerous

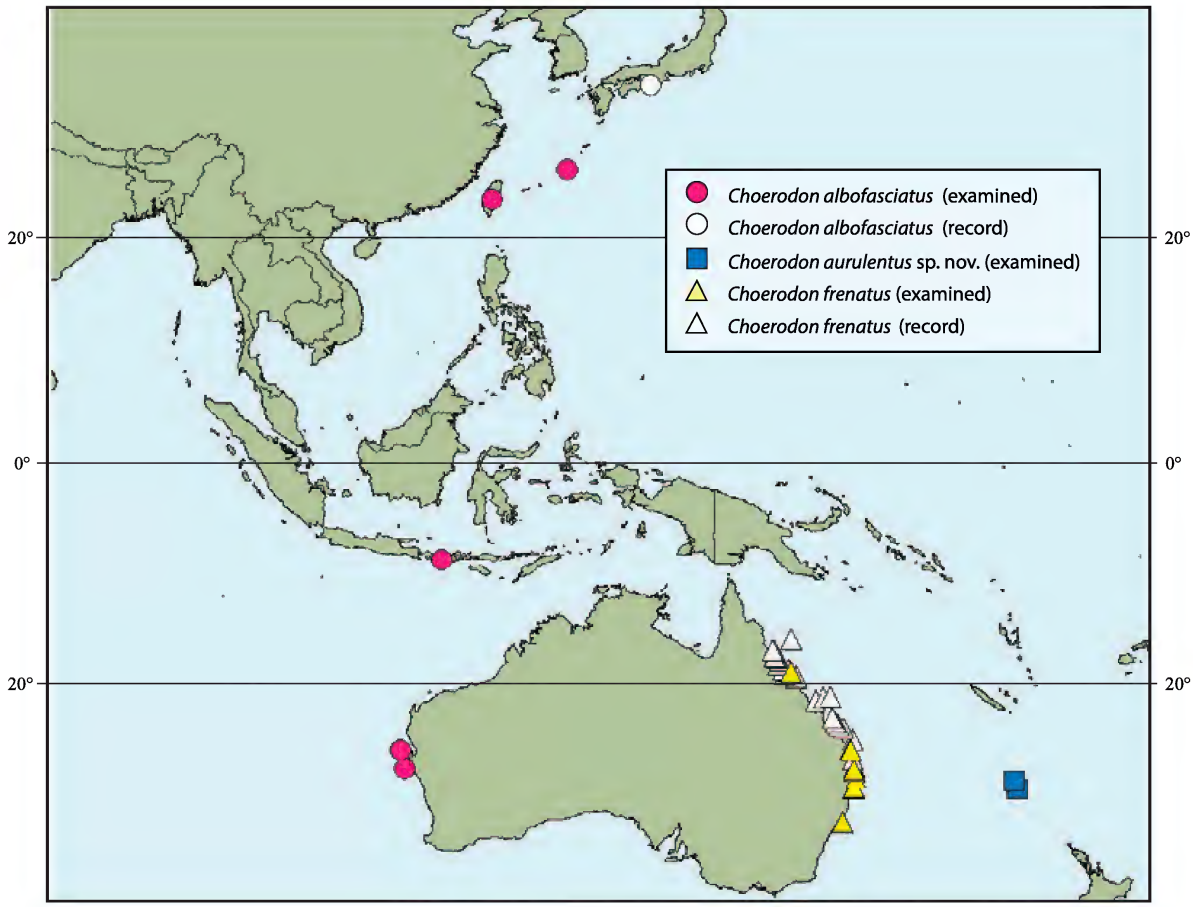

Figure 34. Distributions of *Choerodon albofasciatus* nom. nov. (circles), *C. aurulentus* sp. nov. (squares) and *C. frenatus* (triangles) based on specimens examined (coloured) and collection registration records (white).

confined to lines or short branches associated with major canals between and behind eye, less numerous in front of and below eye; scales above lateral line about 2½; second pair of canines in lower jaw directed laterally, recurved posteriorly dorsal and anal fins without basal sheath, additional small scale at top of some oblique rows; posterior lobe of dorsal and anal fins just reaching hypural crease; caudal fin truncate, with posterior margin mostly straight, upper and lower corners slightly pointed; pelvic fin to anus or anal fin origin, length 24.6–25.8% SL. Green above, white below with with pearly blue midlateral stripe angled from underside of eye to base of caudal fin; additional blue stripes curving from front of eye to upper jaw and across lower part of head from underside of lower jaw to preopercular margin; terminal phase golden midlaterally, scales with vertical pearly bar and second pearly blue stripe from back of eye along lateral line to top of caudal peduncle; scales posteroventrally with vertical pearly blue line; lines on head with gold margins.

Reaches moderately small maximum size, largest specimen examined 181 mm SL.

Description. Dorsal fin rays XII, 8; anal fin rays III, 10; caudal fin rays 9 + 12 + 9 (8 + 12 + 8); pectoral fin rays ii, 13; vertebrae 10 + 17 = 27; pleural ribs ending on 10th vertebra; epipleural ribs ending on 13th vertebra; lateral line scales 27 + 2; scales above lateral line 2½; scales below lateral line approximately 8½; predorsal scales approximately 7; total gill rakers 13.

(See Table 6 for selected measurements expressed as percent of SL or HL.) Body shallow, greatest depth at dorsal fin origin, 3.4 in SL; caudal peduncle moderately slender, depth 8.8 (9.5) in SL; head large and shallow, length 2.6 (2.7) in SL, depth at posterior extent of orbit 1.5 in HL; snout of moderate length, 3.2 (3.0) in HL; head bluntly pointed; dorsal outline of forehead and snout convexly curved, nape a gentle convex curve; eye large, orbit 5.3 in HL; interorbital moderately broad; jaws not attenuate.

Predorsal scales reaching forward on dorsal midline of head barely in advance of above dorsal end of preopercle. Cheek only partially covered by scales, scales small, mostly embedded, about 4 vertical rows, posteriormost row with about

Figure 35. *Choerodon aurulentus* sp. nov. Paratype, NSMT-P 122932, 177 mm SL, Western South Pacific, New Zealand, Norfolk Ridge, 28° 44.4' S, 167° 55' E, photo compliments of Far Seas Fisheries Laboratory, Japan.

7 scales to upper extent of free preopercular edge, scales not reaching forward quite to below centre of eye, lower third or more of cheek above ventral edge of preopercle naked; opercle fully covered by large imbricate scales; subopercle with row (1 or 2 rows) of about 8 (7 or 8) embedded scales adjacent ventral edge of preopercle extending forward just more than half way to anterior extent of free ventral preopercular edge; lower jaw naked. Lateral line scales each with unbranched laterosensory canal tube. Cephalic sensory canal pores moderately numerous confined to lines or short branches associated with major canals between and behind eye, less numerous in front of and below eye. Posterior edge of preopercle very finely serrate. Mouth mostly horizontal, posterior corner of upper lip fold below point just anterior to forward extent of orbit; lower lip moderately narrow; upper lip narrow and mostly obscured by skin flap except at anterior end of jaw; posterior end of maxilla not exposed. Gill rakers on first arch arborescent.

Upper jaw with 2 prominent anterior canines; first prominent canine slightly longer than second; both canines directed mostly ventrally, first slightly laterally; dental ridge smooth to slightly rough; posterior canine well developed. Lower jaw with 2 prominent anterior canines, both as well as anterior tooth of upper jaw exposed when mouth occluded; first canine slightly shorter than second; first canine directed anterodorsally, second dorsolaterally recurved posteriorly; dental ridge smooth anteriorly, followed by 1 or 2 short stout canines and dental ridge posteriorly. Vomerine teeth absent.

Dorsal fin spines subequal, pungent; pointed membrane behind tip of each spine attached basal to and extending distinctly beyond spine tip, posterior tip of dorsal and anal fin narrowly rounded, posterior rays not produced; posterior tip of fins not reaching to posterior edge of hypurals, anal approaching edge. Dorsal and anal fins without scaley basal sheath, at most ½ scale at base. Caudal fin truncate with upper and lower corners pointed, distinctly but only slightly produced, dorsalmost rays 1.3 (1.1) times length of rays at centre of fin, posterior margin straight. Pectoral fin with dorsalmost ray very short, ventralmost ray distinctly longer than those immediately above, posterior edge of fin falcate, dorsoposterior corner bluntly pointed, posteroventral corner sharply pointed. Pelvic fin of moderate length, posterior tip of fin reaching anus.

Reaches moderately small maximum size, largest specimen examined 181 mm SL.

Pigmentation in alcohol. Juveniles unknown. Adults dusky above, pale below; head with narrow darker edged pale stripe curving from front of eye to upper lip anteriorly, second horizontal stripe adjacent to underside of eye extending posteriorly on head and curving downward to third stripe anteriorly behind mouth, third stripe curving across cheek to posterior extent of upper jaw and across lower jaw ventrally. Pectoral fin base crossed by narrow pale band adjacent proximal ends of rays.

Fresh colours. Juveniles unknown. Adults bluish green in front of eye and along dorsal surface above level of eye, remainder of head and body stark white with golden markings, including narrow golden horizontal stripe from lower margin of eye to dorsoposterior corner of caudal peduncle (fig. 35); scales midlaterally behind pectoral fin outlined with gold; head with pair of golden stripes curving from anterior margin of eye to upper jaw; posterior band continuing onto chin and joined on upper lip to 3rd band directed posteriorly to preopercular margin; 4th band parallel with 3rd from underside of lower jaw across corner of mouth to preopercular margin; opercle with scattered irregular golden spots posterior to preopercular edge; golden band across pectoral base with white margin posteriorly; gold marks on scales anterior to pectoral fin base. Dorsal fin rosy pink; anal fin white; both fins with narrow yellow submarginal stripe distally; caudal fin white with horizontal gold streaks. Pectoral fin hyaline; pelvic fin white with lengthwise yellow submarginal line near leading edge.

Etymology. The name *aurulentus* is Latin for "ornamented with gold", in reference to the prominent golden markings characterising this species.

Distribution. Known from only two specimens collected on the Norfolk Ridge in the north-eastern Tasman Sea between New Caledonia and New Zealand (fig. 34) at depths of 80–90 m.

Comments. Of the six species in the subgenus with which it shares a crescent-shaped pectoral fin and dorsal fin for formula of XII, 8, *C. aurulentus* is most similar to those with the confirmed presence of one or two white or pearlescent narrow stripes on the body, at least in adult males of *C. albofasciatus*, *C. gymnogenys* and the cognates *C. gomoni* and *C. margritiferus*. *Choerodon aurulentus* differs from *C. albofasciatus* and *C. gymnogenys* in having cheek scales reaching forward to below the centre of the eye, rather than to the anterior end of the exposed ventral edge of the preopercle in the former and forward barely to below the posterior extent of the orbit in the latter, as well as in details of colour patterns. *Choerodon aurulentus* is the largest of the dwarf tuskfishes, and although the two types have proportional measurements that differ from those of *C. gomoni* and *C. margaritiferus*, the latter species reach a considerably smaller maximum size and differences observed in features like body depth, head length, orbital diameter and snout length, might be interpreted as simply representing allometric changes. Without question, the nearly identical colour pattern of the two *C. aurulentus* types differs considerably from those of both males and females of the other two.

Choerodon frenatus Ogilby, 1910
Bridled Tuskfish

Figures 34, 36; table 5; appendix.

Choerodon frenatus Ogilby, 1910b: 99, 19 miles N 30° W from Double Island Point (Queensland).

Diagnosis. Dorsal fin rays XIII, 7; anal fin rays III, 10; pectoral fin rays ii, 13, rarely 14, dorsalmost ray short 6.7–16.8% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular; body shallow, 27.1–30.5% SL, head depth 21.8–25.6% SL, caudal peduncle depth 11.7–13.3% SL; head blunt, dorsal profile of snout steep, snout length 11.6–14.3% SL; predorsal scales approximately 5, reaching forward on dorsal midline to or just in advance of posterior edge of preopercle; cheek with small partially embedded scales in about 6 or 7 diagonal rows, posteriormost with about 7 or 8 scales to upper extent of free preopercular edge, reaching forward approaching corner of upper lip crease above mouth, with broad naked margin posteriorly and ventrally on preopercle; 2 or 3 rows of about 8 small scales (fewer scales in outer rows) covering much of subopercle adjacent preopercular edge extending forward to about anterior end of ventral preopercular margin, each lateral line scale with multiple branched laterosensory canal tube; scales above lateral line about 2½ or 3; extremely numerous fine cephalic sensory canal pores on top of head, in front of and below eye and on lower jaw; second pair of canines in lower jaw directed dorsolaterally and recurved slightly posteriorly; dorsal and anal fins with very low basal sheath, comprising 1 smaller scale; posterior lobe of dorsal and anal fins reaching well short of hypural crease; caudal fin with central rays longer than those above and below, posterior margin of fin with convex angle centrally, corners of fin slightly produced in adults, most pronounced in large adults; pelvic fin reaching well short of anus, approaching anus in large adults, length 20.1–23.4% SL. (See Table 5 for additional meristic and morphometric ranges.) Olive above, white below with elongate reddish brown stripe-like blotch above lateral midline, at least anteriorly, and pale blue to opalescent centres on scales posteroventrally; head with pale blue lines angled anteroventrally from eye and broader horizontal line on lower jaw.

Reaches moderately small maximum size, largest specimen examined 136 mm SL but attaining 175 mm TL (Ogilby, 1910b) and reported to 200 mm TL (Kuiter, 2010: 63).

Pigmentation in alcohol. Juveniles pale, slightly duskier above. Adults dusky above, underside pale, distinct demarcation at horizontal in line with posterior end of upper lip; each side of head with parallel pair of pale lines directed anteroventally from front of eye, 3rd pale line from eye to posterior end of upper lip, 4th angled more horizontally below posterior half of eye about midway up cheek; dorsal fin dusky with narrow pale distal margin; anal fin pale; caudal fin pale with faint dusky spot or small blotch centrally on caudal fin base above posterior edge of hypurals; middle of caudal fin dusky tapering posteriorly, corners pale dorsally and ventrally. Pectoral and pelvic fins pale.

Fresh colours. Juveniles similar to adults. Adults red, strongly washed with olive brown above lateral line anteriorly (fig. 36); side pink, uniformly so or with pale blue to lavender spot on each scale behind appressed pectoral fin, spots covering most of scale in large individuals; underside of head, throat and abdomen pearly white; predorsal and interorbital area and blotch on opercle violet; face below and in front of eye orange; 2 dark blue-edged pale blue stripes in front of eye, upper continuing across midline in front of eye, lower across tip of snout, 3rd line from middle of upper jaw to and along ventral edge of eye, and 4th from angle of mouth to preopercular edge, bands somewhat variable between individuals; bases of canine teeth blue. Dorsal and caudal fins green to red; dorsal with pale blue, yellow-edged submarginal stripe; caudal fin washed with gold basally, dorsoposterior and ventroposterior corners broadly hyaline; anal fin white with broad yellow midlateral stripe. Pectoral and pelvic fins hyaline; pelvic fin with lengthwise submarginal yellow line adjacent to leading edge.

Etymology. The name *frenatus* is apparently from the Latin *frenum* meaning "bridle" or "rein", in reference to the halter-like blue lines on the head.

Distribution. Endemic to the east coast of Australia from just south of Cairns, Queensland to about the Clarence River, New South Wales (fig. 34). Occurs over rubble bottom at depths of 28–83 m.

Comments. Only one (AMS I.12536, 136 mm SL) of the five specimens examined by Ogilby (1910b: 99) for his description appears to be in the Australian Museum collection, although a specimen in the Queensland Museum collection (QMB I.475, 105 mm SL) is registered as being collected at the type locality and has approximately the same length as that given for the

Figure 36. *Choerodon frenatus*. A, Initial phase adult, QMB I.37338, 111 mm SL, 19° 20.2' S, 148° 17.8' E, photo complements of Qld DPI & Fisheries; B Terminal phase adult, AMS I.31472-005, 105 mm SL, Yamba, New South Wales, photo by K. Graham, NSW Fisheries.

lower end of the examined specimen range, 127 mm SL. The length of the Australian Museum specimen is close to the upper end of that range and that specimen is regarded as the lectotype.

Choerodon frenatus is distinctive and unlikely to be confused with others within the genus. As well as a relatively unique profile, the species has an extraordinarily high number of fine pores covering the head. Unlike the majority of species in the subgenus, *C. frenatus*, *C. jordani* and *C. zosteropherus* have a pectoral fin like those of other species of *Choerodon* without the extended ventralmost rays. The three also have XIII, 7 dorsal fin elements characteristic of most species in other subgenera, rather than XII, 8 rays as in other members having the modified pectoral fin.

Judging from the paucity of specimens in museum collections, *C. frenatus* lives in habitats infrequently trawled. When collected, it is usually taken as groups of individuals rather than as lone specimens.

Material examined. 47 specimens, 52–136 mm SL; see appendix.

Choerodon gomoni Allen & Randall, 2002
Gomons Tuskfish

Figures 37, 38; table 5; appendix.

Choerodon gomoni Allen and Randall, 2002: 110, figs 1–2, Chesterfield Bank, Coral Sea.

Diagnosis. Dorsal fin rays XII, 7 or 8; anal fin rays III, 9 or 10; pectoral fin rays ii, 13, rarely 14, dorsalmost ray short, 8.3–16.4% pectoral fin length, ventralmost ray distinctly longer than those immediately above, posterior edge of fin falcate, dorsoposterior corner bluntly pointed, posteroventral corner sharply pointed; body shallow, 24.4–28.6% SL, head depth 20.1–24.6% SL, caudal peduncle depth 9.2–10.3% SL; head bluntly pointed, dorsal profile of snout shallow curve, snout length 9.4–11.9% SL;

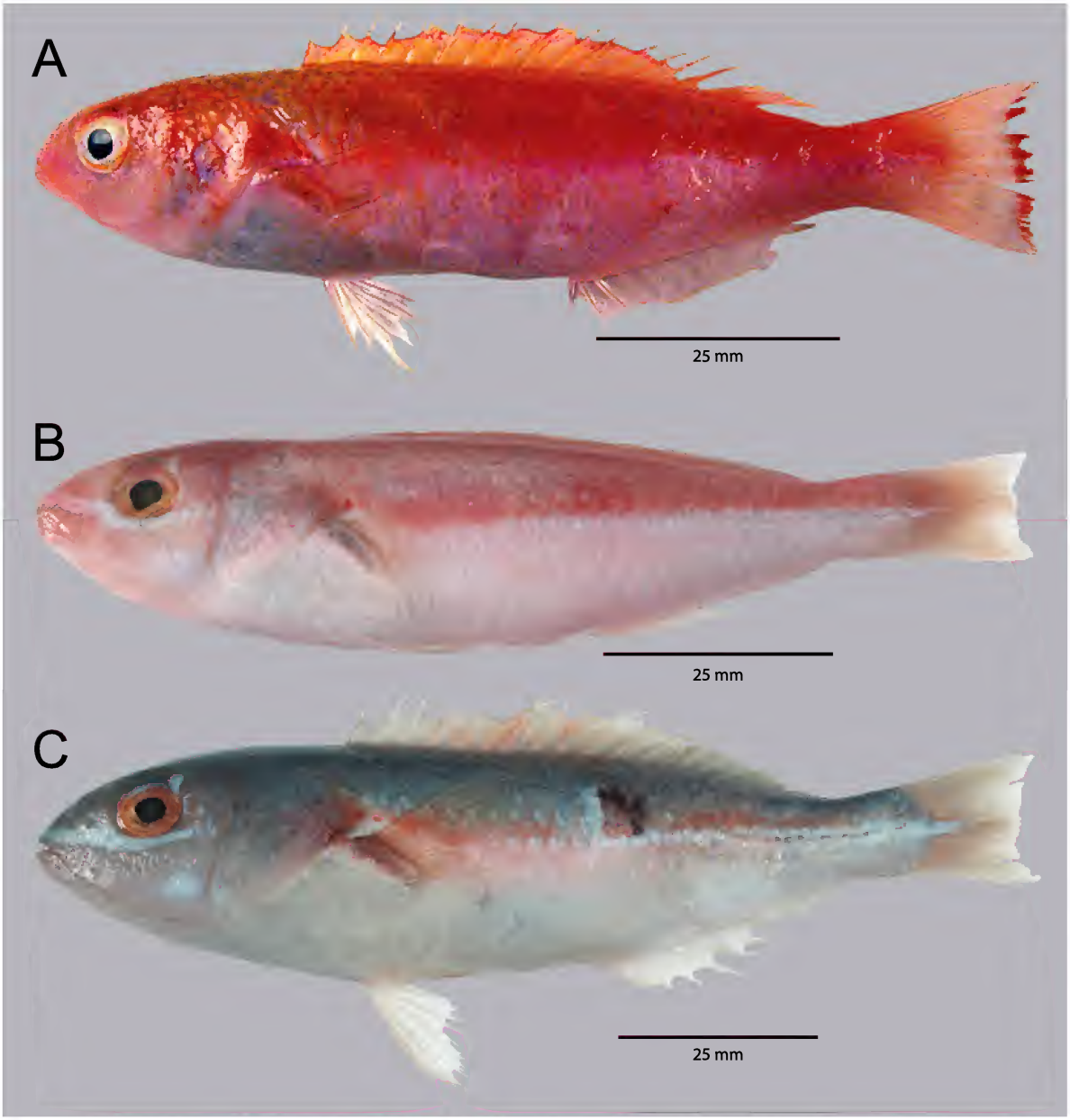

Figure 37. *Choerodon gomoni*. A, Juvenile, CSIRO H 6442-06, 85.2 mm SL, east-north-east of Hayman Island, Queensland, Australia, 19.6653° S, 150.0759° E, photo by D. Gledhill, CSIRO; B, Initial phase adult, CSIRO H 3436-04, 92.0 mm SL, Blackwood Channel, Cape York, Queensland, Australia, photo by D. Gledhill, CSIRO; C, Terminal phase adult, CSIRO H 3441-01, 106 mm SL, Blackwood Channel, Cape York, Queensland, Australia, photo by D. Gledhill, CSIRO.

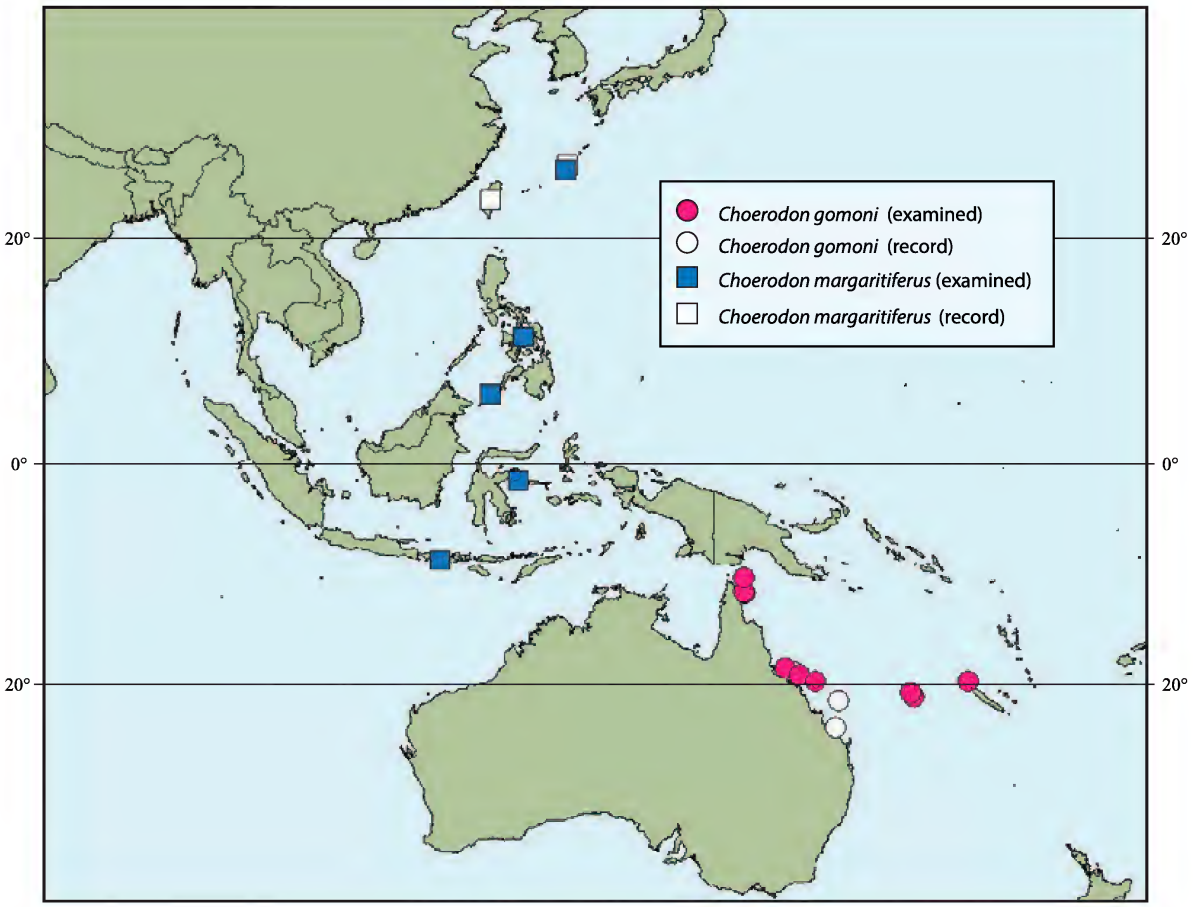

Figure 38. Distributions of *Choerodon gomoni* (circles) and *C. margaritiferus* (squares) based on specimens examined (coloured) and collection registration records (white).

predorsal scales approximately 6, reaching forward on dorsal midline just in advance of midpoint between posterior extent of eye and posterior edge of preopercle; cheek with small partially embedded scales in about 3 diagonal rows, posteriormost with about 7 scales to upper extent of free preopercular edge, reaching forward about half way between corner of upper lip crease and posterior edge of preopercle and ventrally about half way between lower extent of orbit and ventral edge of preopercle, with extemely broad naked margin posteriorly and ventrally on preopercle; about 2 rows of about 7–9 small scales (only about 1 or 2 scales in second row when present) on subopercle adjacent preopercular edge extending forward just in advance of posteroventral corner of preopercular margin; each lateral line scale with unbranched laterosensory canal tube; scales above lateral line about 2½ or 3; cephalic sensory canal pores moderately numerous confined to lines or short branches associated with major canals; second pair of canines in lower jaw directed anterodorsally and recurved laterally; dorsal and anal fins without basal sheath, 1–3 progressively smaller accessory scales adjacent to fin base; posterior lobe of dorsal and anal fins reaching well short of hypural crease; caudal fin truncate, often with posterior margin slightly convex medially, upper and lower corners slightly produced; pelvic fin reaching to terminal phase or well short of initial phase anus, length 19.1–22.9% SL. (See Table 5 for additional meristic and morphometric ranges.) Pink, somewhat olive above, white below with broad midlateral reddish brown stripe from above pectoral fin base to base of tail; broad horizontal blue line below eye; terminal phase with dark brown to black bar on upper half of side below 9th to 11th dorsal fin spines.

Reaches small maximum size, largest specimen examined 106 mm SL.

Pigmentation in alcohol. Juveniles uniformly pale. Inital phase adult pale with narrow dusky midlateral stripe posteriorly on caudal peduncle. Terminal phase adults dusky dorsally, lower 2/3 of side pale with narrow dusky stripe posteriorly onto base of caudal fin; darker dusky blotch crossing lateral line below

last few dorsal fin spines; head dusky dorsally with darker stripe crossing snout at level of ventral margin of eye; fins pale.

Fresh colours. Juveniles unknown.

Initial phase washed with pink, rosy dorsally, paler pink to white ventrally, separated by faint yellow to orange brown stripe from upper part of pectoral fin base to middle of upper half of caudal fin base; fins hyaline to white (fig. 37A & B); caudal fin with bright red margin posteriorly (Allen & Randall, 2002: fig. 2).

Terminal phase greenish grey dorsally, mostly cream to yellowish white ventrally with pale mauve tinge above lateral line; head slightly pink (fig. 37C); broad white stripe crossing snout, extending under eye and continuing along lateral midline to centre of caudal fin base; faint yellow to dark red lateral stripe above white stripe from upper pectoral base to upper portion of caudal fin base; large, diffuse, reddish brown spot on back below base of 9th to 11th dorsal fin spines, its anterior edge bordered with white; second much smaller, fainter red spot above pectoral fin. Fins mainly pale bluish white to hyaline; dorsal and anal fins with pale yellow stripe across middle of fin, distal third of dorsal pink. (Allen & Randall, 2002: fig. 1; Allen & Erdmann, 2012: 646, middle).

Etymology. The name *gomoni* recognises the contributions made to the understanding of labrid fishes by Martin F. Gomon (NMV).

Distribution. Apparently confined to the south-western Pacific off the north-east coast of Australia, New Caledonia and the intervening Coral Sea (fig. 38). Occurs above rubble bottom at depths of 24–82 m.

Comments. This species is very similar to *C. margaritiferus* known from the Philippines, Taiwan and southern Indonesia. Both have nearly identical primary phase and terminal phase colour patterns, differing only slightly in details such as the nature and position of the prominent dark spot posteriorly on the side relative to the lateral line in terminal phase adults. The marking is black with a blue leading edge and is situated just under the lateral line below the last few dorsal fin spines in *C. gomoni* but orange–brown with a blue anterior margin in a position above the lateral line in *C. margaritiferus*. The eye of *C. gomoni* also appears to be slightly larger (8.3–8.6% SL, 21.6–23.4% HL, 71.4–83.1% snout length) than that of *C. margaritiferus* (8.3–8.6% SL, 21.6–23.4% HL, 71.4–83.1% snout length). Genetic evidence supports the distinction of *C. gomoni* and *C. margaritiferus* with a close sister relationship between the two (Puckridge *et al*., 2015: 67, fig. 1). A paratype of *C. gomoni* (WAM P. 31498-003) collected in the Bengai Islands east of central Sulawesi, Indonesia is a specimen of *C. margaritiferus*.

This is one the smallest species of *Choerodon*, the largest specimen examined measuring 106 mm SL. Freshly caught specimens are strongly washed with a bright rosy hue that rapidly fades after death. It is also one of the few *Choerodon* species known to aggregate as evidenced by large collections along the northern Queensland coast and observations by the original authors (Allen & Randall, 2002: 113).

Material examined. 30 specimens, 71.5–106 mm SL; see appendix.

Choerodon gymnogenys (Playfair & Günther, 1867)
Zanzibar Tuskfish, Purplelined Wrasse

Figures 39, 40; table 5; appendix.

Xiphochilus gymnogenys Playfair & Günther, 1867: 85, pl. XII, fig. 4, Zanzibar.

Diagnosis. Dorsal fin rays XII, 8; anal fin rays III, 10; pectoral fin rays ii, 13, rarely 14, dorsalmost ray short 5.2–13.9% pectoral fin length, ventralmost ray distinctly longer than those immediately above, posterior edge of fin falcate, dorsoposterior corner bluntly pointed, posteroventral corner sharply pointed; body shallow, 29.3–32.0% SL, head depth 24.0–27.3% SL, caudal peduncle depth 10.0–11.4% SL; head bluntly pointed, dorsal profile of snout oblique, snout length 12.2–15.5% SL; predorsal scales approximately 7, reaching forward on dorsal midline to or just in advance of midpoint between posterior extent of eye and posterior edge of preopercle; cheek with small partially embedded scales in about 2–5 diagonal rows, posteriormost with about 2–3 scales extending ventrally just below upper extent of free posterior preopercular edge and little below ventral extent of orbit, not quite reaching forward to posterior extent of orbit, leaving most of cheek naked; 1 or 2 rows of about 6–9 small scales (only about two scales in second row when present) on subopercle adjacent preopercular edge extending forward just short of anterior end of ventral preopercular margin; each lateral line scale with unbranched laterosensory canal tube; scales above lateral line about 2½ or 3; few cephalic sensory canal pores confined to lines or short branches associated with major canals; second pair of canines in lower jaw directed dorsolaterally and curved slightly posterolaterally; dorsal and anal fins without basal sheath, additional small scale at top of some oblique rows; posterior lobe of dorsal and anal fins reaching well short of hypural crease; caudal fin truncate, often with posterior margin slightly convex medially, upper and lower corners slightly to distinctly pointed; pelvic fin reaching just short of anus to just short of anal fin origin, length 21.3–26.1% SL. (See Table 5 for additional meristic and morphometric ranges.) Red above, white below; terminal phase with olive back and narrow blue lines midlaterally, others associated with eye.

Reaches moderately small maximum size, largest specimen examined 140 mm SL.

Pigmentation in alcohol. Juveniles unknown. Initial phase adults pale. Terminal phase adults pale dusky above, underside pale, distinct demarcation on head at horizontal in line with posterior end of upper lip to below eye; starck white narrow stripe along lower lip, then horizontally to posterior edge of preopercle; starck white line directed anteroventally from eye to midway along upper lip, short horizontal white line adjacent lower rim of orbit; lower half of operculum below middle of pectoral fin base with moderately broad starck white marginal band; broad white band angled posteroventrally across fleshy base of pectoral fin; broad stark white nearly horizontal stripe from above pectoral fin base and angled slightly upward to lateral line under first few segmented dorsal fin rays, stripe distinctly tapered anteriorly and posteriorly; second much narrower stripe of uniform width below and parallel to first

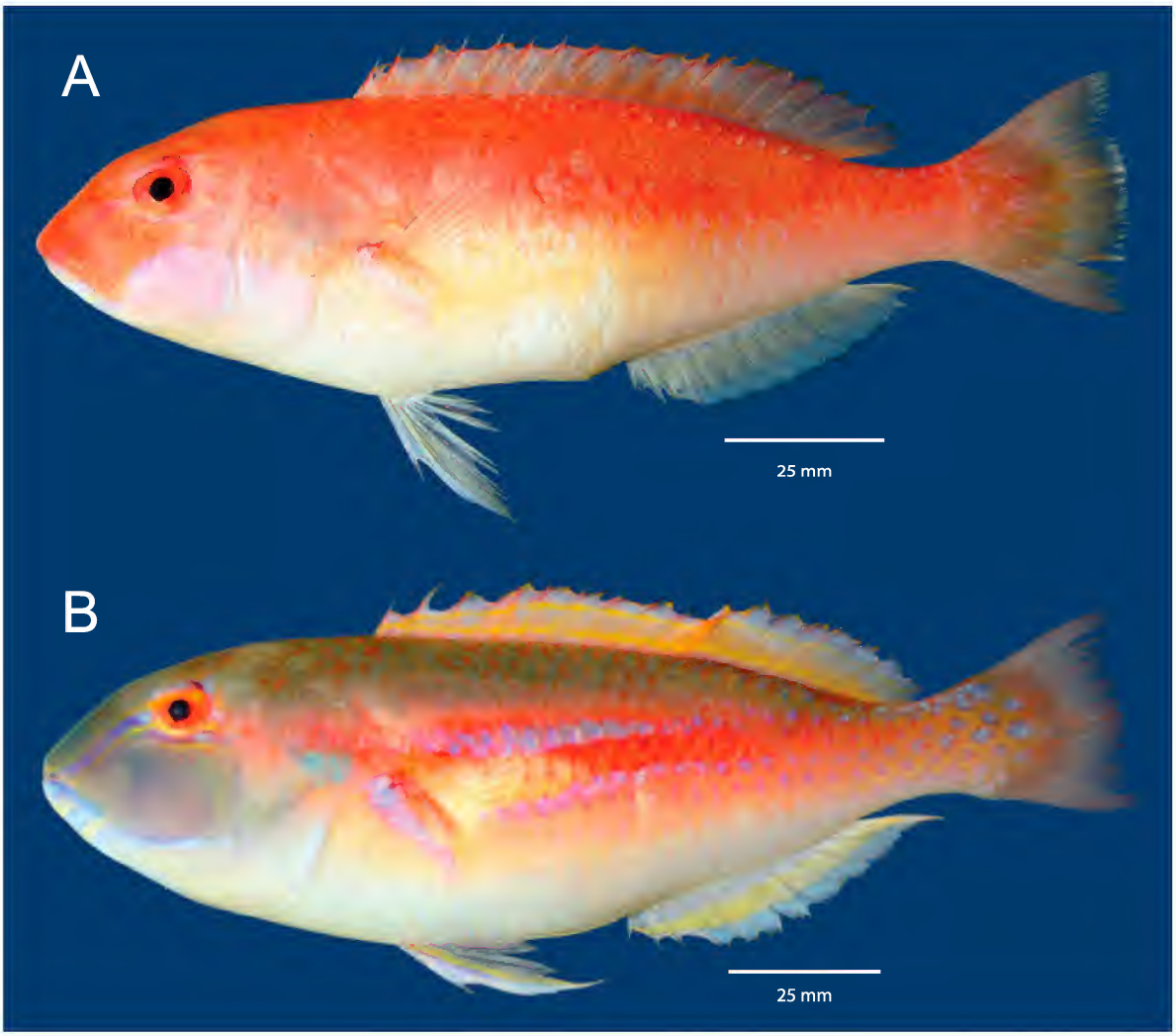

Figure 39. *Choerodon gymnogenys*. A, Initial phase adult, SAIAB 81739, 145 mm SL, Xai-Xai, Mozambique, 26° 9.4' S, 32° 58.6' E, photo by P. Heemstra, SAIAB; B, Terminal phase adult, SAIAB 81739, 150 mm SL, Xai-Xai, Mozambique, 26° 9.4' S, 32° 58.6' E, photo by P. Heemstra, SAIAB.

from just behind lower end of pectoral fin base; third narrow starck white stripe or series of spots on dorsal profile of side from above posterior end of first stripe onto caudal fin base. Fins pale.

Fresh colours. Juveniles unknown. Initial phase adults red above, white ventrally (fig. 39A); head with mauve-tinted white patch covering lower half of cheek extending posteriorly to middle of opercular edge, red pigmentation covering snout and head anteroventral to eye to margin of upper jaw; pair of mauve lines directed from eye to upper jaw. Fins milky to hyaline; dorsal fin with red broad basal stripe and narrow distal margin; middle of anal fin with broad faint yellow stripe; caudal fin yellowish red basally with white distal margin; pelvic fin with faint yellow lengthwise stripe along posterior edge of first segmented ray (Kuiter, 2010: 62, bottom B).

Terminal phase olive green dorsally, red midlaterally on side transitioning to orange, yellow and white ventrally with pair of pearly or mauve to blue dorsoposteriorly angled lines or series of spots, dorsalmost from above pectoral fin base to lateral line below bases of first few segmented dorsal fin rays and second from axilla of pectoral fin to centre of caudal fin base (fig. 39B); head with pair of yellow margined blue lines directed anteroventrally from eye to upper jaw; blue line on lower lip continuing horizontally to posterior margin of preopercle; mauve blotch on cheek and greenish blue blotch dorsally on opercle; pectoral fin base with mauve to blue band;

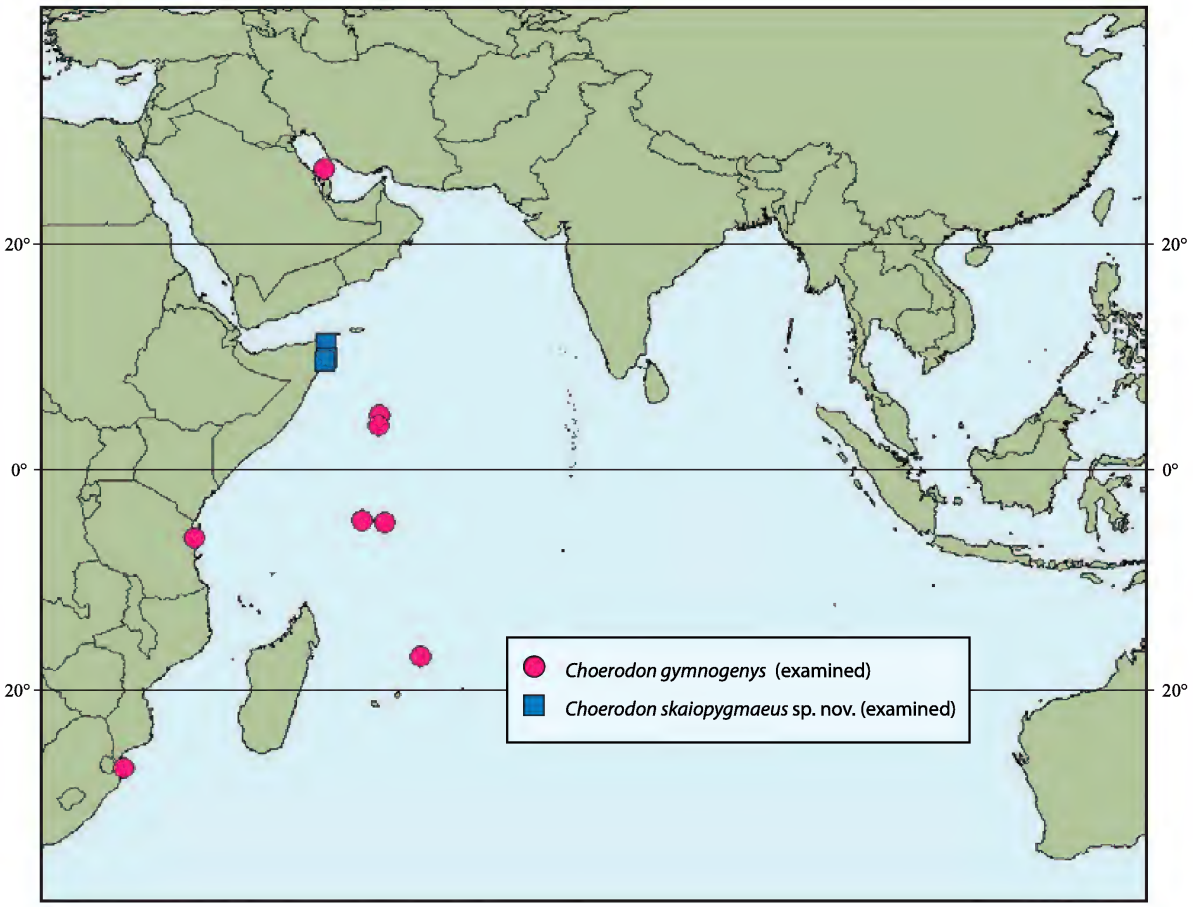

Figure 40. Distributions of *Choerodon gymnogenys* (circles) and *C. skaiopygmaeus* sp. nov. (squares) based on specimens examined.

dorsal fin pale blue with yellow sub-basal and sub-distal stripes; anal fin pale blue with broad yellow midlateral stripe; caudal fin somewhat orange basally; pectoral fin yellow; pelvic fin milky with lengthwise yellow stripe as in initial phase adults (Smith, 1949: pl. 101, fig. 776a, as *Peaolopesia gymnogenys*; Kuiter, 2010: 62, bottom A & C).

Etymology. The name *gymnogenys* is from the Greek *gymno* for "naked" and *genys* for "cheek", in reference to the lack of scales on all but the dorsoposterior corner of the cheek in this species.

Distribution. Restricted to the western Indian Ocean from Mozambique and St Brandon Shoals through the Seychelles Bank to the Arabian Gulf, although the last locality is based on specimens collected in 1861 and may not be reliable (fig. 40). Occurs on open rubble bottom in relatively deep water to depths of at least 60 m (Kuiter, 2010: 62).

Comments. This species has been a source of confusion since its description by Playfair and Günther (1867: 85). Although the authors gave only a single length of seven inches, four specimens in the British Museum collection (BPBM 1864.11.15.28, dried skin, 132 mm SL; BPBM 1866.1.19.17, 140 mm SL; BPBM 1866.1.19.18, 132 mm SL; BPBM unregistered, 118 mm SL) were collected by Playfair, presumably prior to the publication of the original description. In the absence of contradictory information, the largest specimen (BPBM 1866.1.19.17) is here regarded as lectotype.

Smith erected the genus *Peaolopesia* for the species, first as a *nomen nudum* (1949: pl. 101, fig. 776a), and subsequently (1953: 520) designated *Xiphochilus gymnogenys* Playfair and Günther, 1867 formally as type species. Smith (1957: 101) then synonymised the species with *Julis matthaei* Valenciennes, in Cuvier and Valenciennes (1839: 419) on the basis of Valenciennes' description alone. The latter is a junior synonym of *Julis genivittatus* Valenciennes, in Cuvier and Valenciennes, 1839 (= *Thalassoma genivittata*; Randall and Smith, 2001: 119). Fricke's (1999: 405) record of *Choerodon matthaei* in the Mascarenes is based on Smith's error. Randall (in Smith & Heemstra, 1986: 690, pl. 94) corrected the misperception, but inadvertently

reproduced Playfair and Günther's (1866: pl. XII, fig. 3) colour figure of *Xiphochilus robustus* to illustrate *C. gymnogenys*.

Choerodon gymnogenys has been applied to very similar con-subgenerics in the western Pacific (e.g. *C. albofasciatus* as *Paeolopesia gymnogenys* – Masuda *et al.*, 1975: 294, Masuda *et al.*, 1984: 202, Okamura & Amaoka, 1997: 519, Nakabo, 2000: 969; and as *Choerodon gymnogenys* – Shen, 1993: 452, Chen *et al.*, 2010: 384), but is clearly separable from them by the greatly reduced cheek squamation, as thought by its original authors. It appears to share the rosy hue in life with *C. gomoni* and *C. margaritiferus* (figs 36, 38 & 42).

Material examined. 20 specimens, 99.5–140 mm SL; see appendix.

Choerodon jordani (Snyder, 1908)
Dagger Tuskfish

Figures 41, 42; table 5; appendix.

Choerops jordani Snyder, 1908: 98, Naha (Okinawa, Japan).

Diagnosis. Dorsal fin rays XIII, 7 (rarely XIV, 6); anal fin rays III, 10; pectoral fin rays ii, 13, dorsalmost ray short 9.6–17.5% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular; body shallow, 29.8–33.0% SL, head depth 22.1–28.1% SL, caudal peduncle depth 11.7–13.1% SL; head bluntly pointed, dorsal profile of snout moderately steep, snout length 9.8–12.5% SL; predorsal scales approximately 5 or 6, reaching forward on dorsal midline to above posterior extent of eye; cheek with small partially embedded scales in about 7–10 diagonal rows, posteriormost with about 10 scales to upper extent of free preopercular edge, reaching forward almost to corner of upper lip crease above mouth, with broad naked margin posteriorly and ventrally on preopercle; 2 rows of about 8–10 small scales with only single scale in second row on subopercle adjacent preopercular edge extending forward nearly to anterior end of ventral preopercular margin; each lateral line scale with single branched laterosensory canal tube; scales above lateral line about 2½ or 3; cephalic sensory canal pores numerous behind eyes immediately in front of predorsal scales, far fewer confined to lines or short branches associated with major canals between and in front of eyes; second pair of canines in lower jaw directed dorsolaterally and curved posteriorly; dorsal and anal fins without prominent basal sheath, 1–3 progressively smaller accessory scales adjacent to fin base; posterior lobe of dorsal and anal fins not quite reaching hypural crease; caudal fin truncate, corners slightly produced in large individuals; pelvic fin reaching to or not quite to anal fin origin, just short of anus in small individuals, length 19.5–27.3% SL. (See Table 5 for additional meristic and morphometric ranges.) Grey above, white below, separated by broad yellow midlateral stripe, broad anteriorly tapered wedge-shaped stripe above lateral midline and large white oval spot below posterior end of dorsal fin and on anterior end of caudal peduncle.

Reaches moderately small maximum size, largest specimen examined 136 mm SL but reported to 170 mm TL (Kuiter, 2010: 64).

Pigmentation in alcohol. Juveniles pale, slightly duskier above with dark blotch dorsally on side extending onto base of dorsal fin at proximal ends of first few rays and second dorsally at posterior end of caudal pecuncle, dark blotches separated by stark white oval patch; fins otherwise colourless. Adults pale with broad dark anteriorly tapering, oblique band from axilla of pectoral fin to bases of first few soft rays of dorsal fin, covering basal third of fin to posterior edge; immaculate pale blotch covering dorsal half of side and top of caudal pecuncle posterior to dark band to hypural crease defined ventrally by dusky pigment; dorsal edge of caudal fin darker.

Fresh colours. Juveniles pale grey with yellow midlateral stripe from anterior tip of mouth to middle of side followed by broad orange patch to base of tail (fig. 41A & B); small juveniles with bright white stripe above yellow and orange stripes, broken by extension of orange patch to dorsal profile of side at bases of last few dorsal fin spines; prominent white edged black spot on dorsal fin immediately above orange patch; caudal fin base with prominent white spot at corners of caudal base dorsally and ventrally; fins otherwise mostly clear. With growth, black spot developing in advance of white spot dorsally on caudal fin base and black spot on dorsal fin enveloping orange patch below (Chen *et al.*, 2010: 382, fig. A & 383, figs B & C; Kuiter, 2010: 64, figs D–F).

Adults grey dorsally, white ventrally with broad yellow midlateral stripe separating the two (fig. 41C & D); black wedge-shaped stripe from just above axilla of pectoral fin to caudal fin base extending as black margin on dorsal edge of caudal fin, lower edge on lateral midline and upper edge angled to base of last dorsal fin spine and continuing onto base of dorsal fin posteriorly; prominent yellow to white spot superimposed on black wedge posteriorly, appearing as saddle on caudal peduncle. Dorsal and caudal fins otherwise grey; anal and pelvic fins white; pectoral fin hyaline (Masuda *et al.*, 1984: pl. 193, fig. E; Allen, 1985: 2407, fig. 332; Shen, 1993: pl. 144, fig. 4; Okamura & Amaoka, 1997: 465, centre second from bottom and right second from top and middle; Chen *et al.*, 2010: 382, fig. D; Kuiter, 2010: 64, figs A–C and G).

Terminal phase adult colouration if differing from initial phase not prominent.

Etymology. The name *jordani* recognises David Starr Jordan, the then President of Stanford University and accomplished ichthyologist.

Distribution. Antitropical in the western Pacific (fig. 42), confined to Japan south of Kochi (Nakabo, 2000: 970), Taiwan and the coast of south-east Asia to Hong Kong in the north, occurring on both coasts of Australia south to the Abrolhos Islands in Western Australia and One Tree Island on the Great Barrier Reef, extending eastward to New Caledonia, Vanuatu, Tonga, Fiji (Randall, 2005: 401; Seeto & Baldwyn, 2010: 39) and American Samoa. Lives over sand and rubble along reef edges at depths of 5–40 m (Kuiter, 2010: 64).

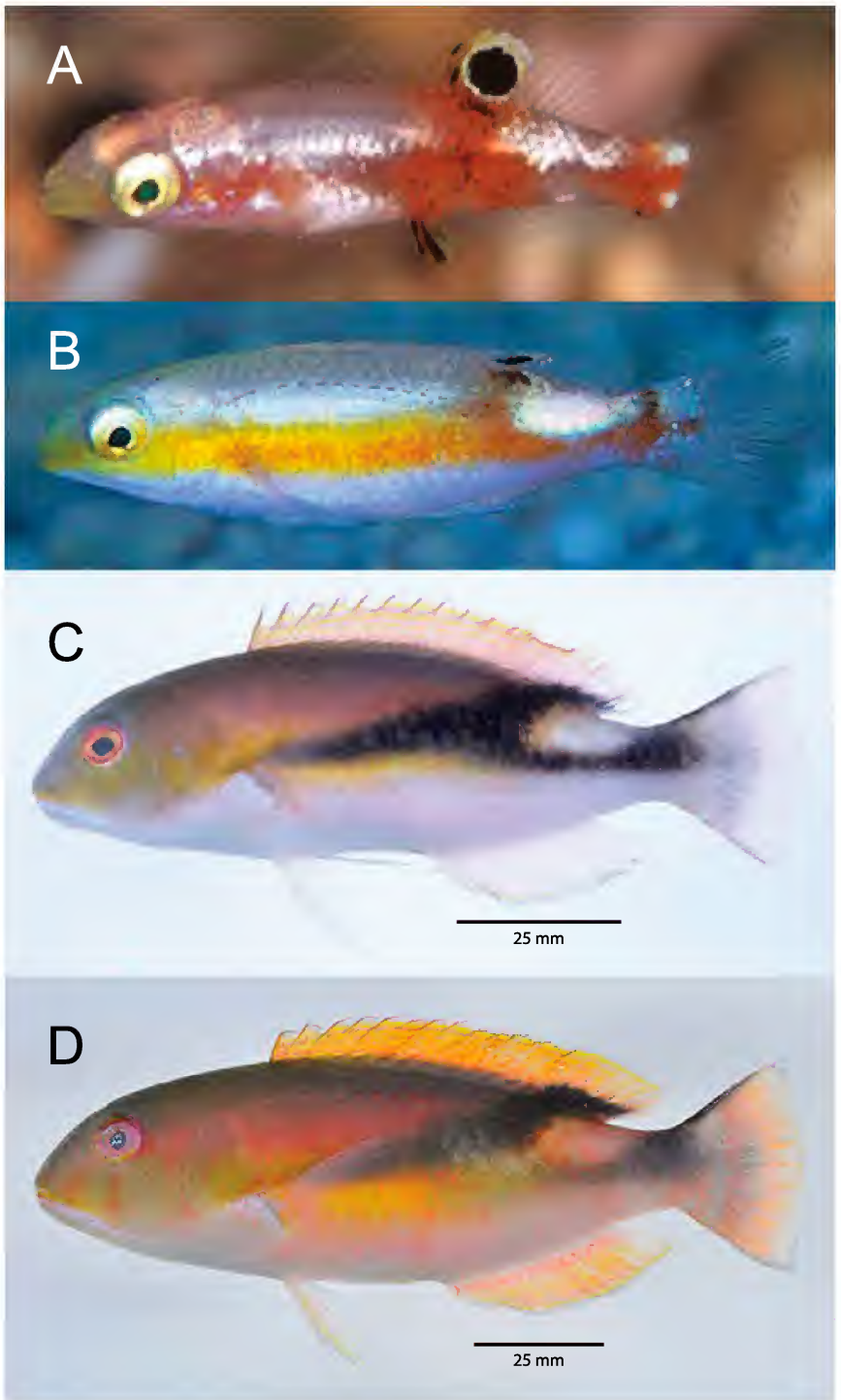

Figure 41. *Choerodon jordani.* A, Juvenile, Manabe, Kii Peninsula, Japan, photo by K. Yamasaki; B, Juvenile, Mana Island, Fiji, photo by K. Uchino; C, Initial phase adult, KPM-NI 19119, 98.0 mm SL, Miyako Island, Ryukyu Islands, Japan, photo by H. Senou, KPM; D, Terminal phase adult, KPM-NI 30612, 124 mm SL, Motobu, Okinawa Island, Ryukyu Islands, Japan, photo by H. Senou, KPM.

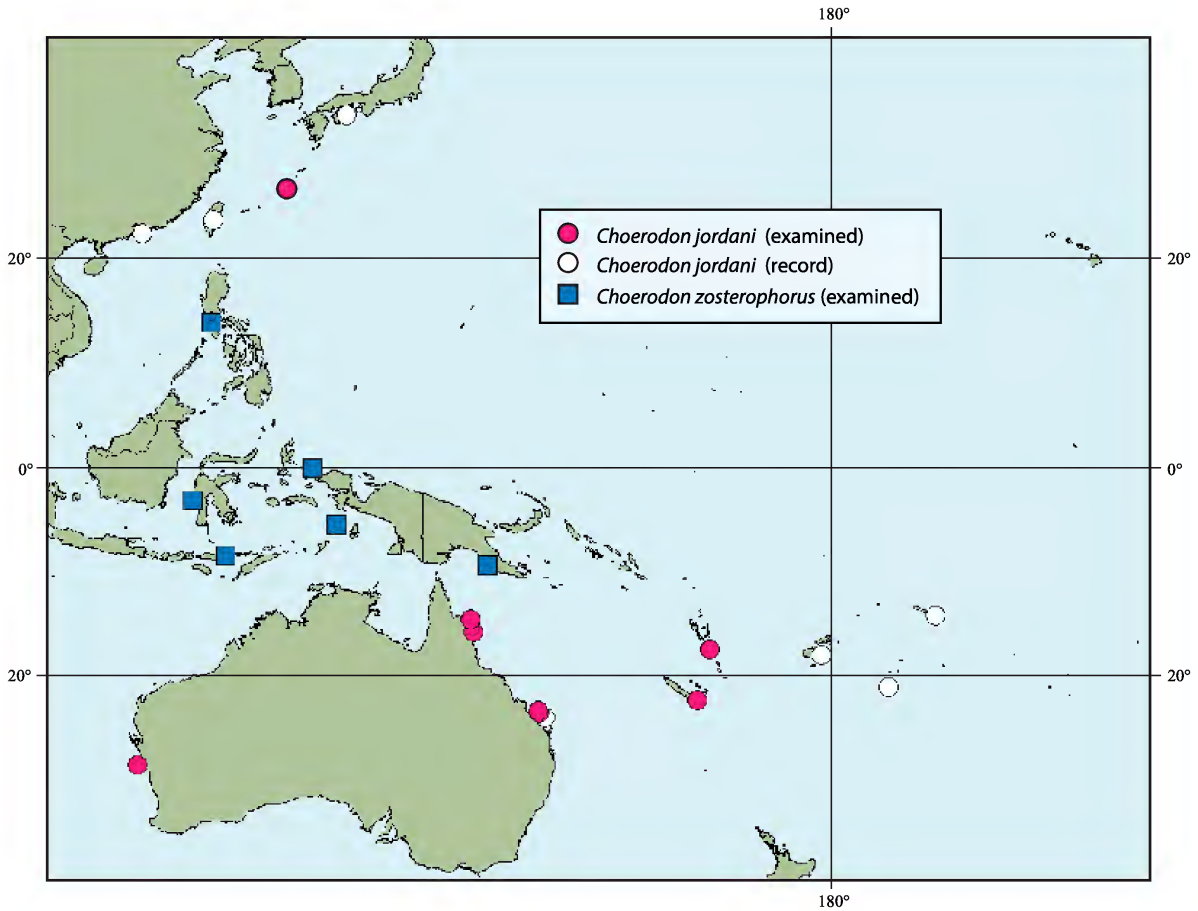

Figure 42. Distributions of *Choerodon jordani* (circles) and *C. zosterophorus* (squares) based on specimens examined (coloured) and collection registration records (white).

Comments. Snyder (1908: 98) based his description of *Choerops jordani* on four specimens acquired from the Naha, Okinawa fish market, designating USNM 62235 (120 mm SL) as holotype.

The species is distinctive, resembling only the very similar *C. zosterophorus*, an apparent alloptric cognate distributed in intervening equatorial latitudes. The two species, along with *C. frenatus*, which lacks a prominent black or white marking on the side, are the only members of the subgenus with a dorsal fin count of XIII, 7 and the more conventional pectoral fin profile of other subgenera. *Choerodon zosterophorus* is distinguishable from *C. jordani* in having an obvious blunt ended oblique white band bordered by a black blotch dorsoposteriorly in place of the black wedge-shaped band on the side.

Material examined. 49 specimens examined, 23–136 mm SL; see appendix.

Choerodon margaritiferus Fowler & Bean, 1928
Pearlyscale Tuskfish

Figures 38, 43; table 5; appendix.

Choerodon margaritiferus Fowler & Bean, 1928: 197, Jolo Market, Jolo (Philippines).

Choerodon sp. A White *et al*., 2013: 266, fig. 89.19 (Lombok, Indonesia).

Diagnosis. Dorsal fin rays XII, 8; anal fin rays III, 10; pectoral fin rays ii, 13, dorsalmost ray short 7.3–12.9% pectoral fin length, ventralmost ray distinctly longer than those immediately above, posterior edge of fin falcate, dorsoposterior corner bluntly pointed, posteroventral corner sharply pointed ted; body shallow, 24.7–30.8% SL, head depth 19.4–25.2% SL, caudal peduncle depth 9.4–10.5% SL; head bluntly pointed, dorsal profile of snout shallow curve, snout length 9.4–12.1% SL; predorsal scales approximately 6 or 7, reaching forward on dorsal midline almost

Figure 43. *Choerodon margaritiferus*. A, Initial phase adult, USNM 435387, 114 mm SL, Cebu, Kawit, Medellin, Visayan Sea, Philippines, photo by J. Williams, USNM; B, Terminal phase adult, USNM 435389, 115 mm SL, Kawit, Medellin, Visayan Sea, Cebu, Philippines, photo by J. Williams, USNM.

to midpoint between posterior extent of eye and posterior edge of preopercle; cheek with small partially embedded scales in about 3 or 4 diagonal rows, posteriormost with about 5 or 6 scales to upper extent of free preopercular edge, reaching forward to below middle of eye with very broad naked margin posteriorly and ventrally on preopercle; 1–3 rows of about 6–8 small scales (only about 2 scales in second row when present) on subopercle adjacent preopercular edge extending forward to about midpoint of ventral preopercular margin; each lateral line scale with unbranched or single branched laterosensory canal tube; scales above lateral line about 2½ or 3; cephalic sensory canal pores variable, mostly confined to lines or short branches associated with major canals to numerous scattered on top of head and anteroventral to eye and apparently not confined to lines or short branches associated with major canals; second pair of canines in lower jaw directed dorsolaterally and curved posterolaterally; dorsal and anal fins without basal sheath, additional small scale at top of some oblique rows; posterior lobe of dorsal and anal fins not quite reaching hypural crease; caudal fin truncate, often with posterior margin slightly convex medially; pelvic fin not quite reaching anus, length 19.0–21.3% SL. (See Table 5 for additional meristic and morphometric ranges.) Initial phase pink overall with white underside and broad orange stripe just above lateral midline; caudal fin with bright reed posterior margin. Terminal phase green above, white below, with interrupted blue stripe midlaterally, horizontal row of blue scales on lateral line anteriorly, row of blue scales adjacent base of dorsal fin posteriorly and horizontal blue stripe below eye from tip of snout to preopercular edge; blue-edged, reddish brown blotch crossing lateral line below 9th to 11th dorsal fin spines.

Reaches moderately small maximum size, largest specimen examined 115 mm SL.

Pigmentation in alcohol. Juveniles uniformly pale. Initial phase adults pale with narrow dusky to dark posterior margin on caudal fin. Terminal phase dusky above, paler below, with narrow pale stripe from tip of snout to lower edge of eye, continuing as broken row of pale spots to pale irregular narrow blotch in pectoral fin axilla continuing as pale spots to above middle of anal fin base;

second narrow pale band in form of spots from behind eye across opercle to side posterior to just above pectoral fin tip; pale band from middle of opercular margin across pectoral fin base; narrow pale stripe below dorsal fin base anteriorly to dorsal caudal peduncle nearly to caudal fin base; additional narrow pale stripe midlaterally underlying lateral line along length of caudal peduncle, becoming dusky to dark with fading of overlying pale pigment. Dorsal and anal fins pale.

Fresh colours. Juveniles unknown.

Initial phase adults pink overall, darker on dorsal half of side and head, breast and belly white (fig. 43A); slightly darker lengthwise stripe above lateral midline to dorsal half of caudal peduncle. Dosal fin pale pink, darker near tips of spines; anal and pelvic fins white; caudal fin yellow with pink basal third and dark red posterior margin. Pectoral fin hyaline. (White *et al.*, 2013: 267, fig. 89.19).

Terminal phase adults greenish grey dorsally, white ventrally with pink hue midlaterally (fig. 43B); terminal phase with large red blotch centred just above lateral line below 9th to 11th dorsal fin spines with oblique grey bar on anterior edge; greyish white stripe originating on posterior edge of operculum just above pectoral fin base breaking into scale-sized spots centrally on side, again becoming prominent stripe on lateral midline below posterior end of dorsal fin, terminating in point anteriorly on caudal fin; second horizontal series of greyish white spots along dorsal profile of side below segmented portion of dorsal fin and on caudal peduncle; additional greyish white spots scattered centrally on side; downward opening crescentic greyish white band on pectoral fin base; head with horizontal greyish white stripe extending from snout tip, below eye to preopercular edge; vertical greyish white mark on dorsoposterior edge of eye; scattered pink blotches, especially on operculum; eye red with yellow dorsal margin on iris and greyish white margin to eye dorsally. Dorsal fin with broad yellow basal stripe slightly narrower pink stripe distally and narrow yellow distal margin; colours less defined posteriorly; anal fin white with broad yellow midlateral stripe and fine yellow distal margin; caudal fin hyaline with pink hue. Pectoral fin hyaline with greyish white rays dorsally; pelvic fin hyaline with pink leading edge bordered by similarly narrow yellow longitudinal stripe (Kuiter, 2010: 63, top; Allen & Erdmann, 2012: 246, bottom; Miyamoto *et al.*, 2015: 84, fig. 1A and B).

Etymology. The name *margaretiferus* is Latin for "pearl bearer", in reference to the series of pearlescent spots on the side of the body.

Distribution. Known conclusively only from Okinawa in southernmost Japan, Taiwan, Philippines, and Indonesia off eastern Sulawesi and Lombok (fig. 38) at depths to at least 30 m.

Comments. Choerodon margaritiferus was described by Fowler and Bean (1928) from a single specimen (USNM 13558, 115 mm SL) purchased at a market in Jolo, Philippines. The apparent absence of other specimens in collections until recently and the overall similarity of members of this complex to one another has caused confusion over the identity of the species to which the name was affixed.

The name *C. margaritiferus* was appropriately applied by Puckridge *et al.* (2015: 5, fig. 1, as *Choerodon margaritiferus*) in their investigation of the interrelationships of species of the genus employing genetic markers. The study recovered *C. margaritiferus* as sister to *C. gomoni*, a species so similar that Randall and Allen (2002: 110) designated a specimen of the former from the Bangai Islands off eastern Sulawesi, Indonesia as a paratype of the latter. The two appear to be among the smallest species of *Choerodon*. They are extremely similar and difficult to separate at initial phase and juvenile sizes.

The specimen from which the tissue was taken for Puckridge *et al.*'s (2015) sequences of *C. margaritiferus* was treated and figured by White *et al.* (2014: 266, fig. 89.19) as *Choerodon* sp. A "Redtip Tuskfish". Like *C. gomoni*, freshly caught individuals have an overall bright rosy hue that obscures underlying colouration and rapidly fades after death. The specimen featuring in the above two studies is a female that differs markedly in colouration from the male shown by Miyamoto *et al.* (2015: 84, fig. 1A & B). The last study also recovered the taxonomic relationships found by Puckridge *et al.* (2015). The species in all three studies tentatively identified as *C. cf. margaritiferus* is *C. albofasciatus*, a new name for *Choerodonoides japonicus* Kamohara, proposed above.

Material examined. 11 specimens, 82.8–115 mm SL; see appendix.

Choerodon skaiopygmaeus sp. nov.

http://zoobank.org/urn:lsid:zoobank.org:act:200B0A56-10B2-47E4-A21D-61236AE91E88

Proposed vernacular: Western Pygmy Tuskfish

Figures 40, 44; table 6

Holotype. USNM 437323 (138) Indian Ocean, Somali coast, 11° 18' S, 51° 08' E, 25–29 m, 17 December 1964, RV Anton Bruun, Cr. 9, Sta. 459, International Indian Ocean Expedition, trawl.

Paratypes. (6 specimens, 75.6–133 mm SL.) BMNH 2017.1.19.1 (106), MNHN-IC-2016-0605 (102), and USNM 437324 (133), same data as holotype; SAIAB 203921 (93.1) Indian Ocean, Somali coast, 10° 00' S, 51° 15' E, 59–61 m, 16 December 1964, RV Anton Bruun, Cr. 9, Sta. 447, International Indian Ocean Expedition, trawl; USNM 437325 (94.7). same data as SAIAB 203921; USNM 437326 (75.6) Indian Ocean, Somali coast, 09° 41' S, 51° 03' E, 60–70 m, 16 December 1964, RV Anton Bruun, Cr. 9, Sta. 445, International Indian Ocean Expedition, trawl.

Diagnosis. Dorsal fin rays XII, 8; anal fin rays III, 10; pectoral fin rays ii, 13, dorsalmost ray very short 9.5–14.1% pectoral fin length, ventralmost ray distinctly longer than those immediately above, posterior edge of fin falcate, dorsoposterior corner bluntly pointed, posteroventral corner sharply pointed; body shallow, 31.0 –34.3% SL, head depth 24.3–28.5% SL, caudal peduncle depth 11.7–13.0% SL; head bluntly pointed, dorsal profile of snout moderately steep, snout length 10.3–13.1% SL; predorsal scales approximately 6, reaching forward on dorsal midline almost to above posterior edge of preopercle; cheek with small partially embedded scales in about 3 or 4 diagonal rows, posteriormost with about 7 or 8 scales to upper

Figure 44. *Choerodon skaiopygmaeus* sp. nov. Holotype, USNM 437323, 138 mm SL, Indian Ocean, Somali coast, 11° 18' S, 51° 08' E, ethanol preserved (grey scale image).

extent of free preopercular edge, reaching ventrally to level of posterior corner of upper jaw and forward little if at all beyond posterior extent of orbit, with very broad naked margin ventrally on preopercle; 1–3 rows of about 6–8 small scales (only 1 or 2 scales in second of 2 rows when present) on subopercle adjacent preopercular edge extending forward to about midpoint of ventral preopercular margin; each lateral line scale with single pore on laterosensory canal tube; scales above lateral line about 2½ or 3; numerous cephalic sensory canal pores scattered on top of head and anteroventral to eye apparently not confined to lines or short branches associated with major canals; second pair of canines in lower jaw directed dorsolaterally and curved laterally; dorsal and anal fins without basal sheath, additional small scale at top of some oblique rows; posterior lobe of dorsal and anal fins not reaching hypural crease; caudal fin truncate, often with posterior margin slightly convex medially; pelvic fin reaching to or just short of anus, length 19.6–22.8% SL. Uniformly pale in preservation except for dusky horizontal stripe from just below lateral line under 8th dorsal fin spine to just beyond posterior end of dorsal fin near top of caudal peduncle.

Reaches moderately small maximum size, largest specimen examined 139 mm SL.

Description. Dorsal fin rays XII, 8; anal fin rays III, 10; caudal fin rays 8 + 12 + 8 (8 or 9 + 12 + 8); pectoral fin rays ii, 13; vertebrae 10 + 17 = 27; pleural ribs ending on 10th vertebra; epipleural ribs ending on 13th (12th or 13th) vertebra; lateral line scales 27 + 2; scales above lateral line 2½; scales below lateral line approximately 8½; predorsal scales approximately 6; total gill rakers 17 (16 or 17, rarely 17).

(See Table 6 for selected measurements expressed as percent of SL or HL.) Body shallow, greatest depth at dorsal fin origin, 2.9 (3.0–3.2) in SL; caudal peduncle moderately slender, depth 8.2 (7.7–8.6) in SL; head large and shallow, length 2.4 (2.4–2.6) in SL, depth at posterior extent of orbit 1.6 (1.4–1.7) in HL; snout of moderate length, 3.2 (3.1–3.7) in HL; head bluntly pointed; dorsal outline of forehead and snout nearly straight, nape a gentle convex curve; eye of moderate size, orbit 5.7 (4.4–5.3) in HL; interorbital moderately broad; jaws not attenuate.

Predorsal scales reaching forward on dorsal midline almost to above posterior edge of preopercle. Cheek only partially covered with small partly embedded scales in about 5 or 6 (3–6) diagonal rows, posteriormost with about eight scales to upper extent of free preopercular edge, reaching ventrally to level of posterior corner of upper jaw and forward little if at all beyond posterior extent of orbit, with very broad naked margin ventrally on preopercle; opercle fully covered by large embedded scales; subopercle with 1–3 rows of about 6–8 small scales (only 1 or 2 scales in second or third rows when present) adjacent preopercular edge extending forward to about midpoint of ventral preopercular margin; lower jaw naked. Lateral line scales each with unbranched laterosensory canal tube. Cephalic sensory canal pores numerous scattered on top of head and anteroventral to eye apparently not confined to lines or short branches associated with major canals. Posterior edge of preopercle very finely serrate. Mouth mostly horizontal, posterior corner of upper lip fold below forward extent of orbit; lower lip moderately narrow; upper lip narrow and mostly obscured by skin flap except at anterior end of jaw; posterior end of maxilla not exposed. Gill rakers on first arch arborescent.

Upper jaw with 2 prominent anterior canines; first prominent canine noticeably longer than second; both canines directed mostly ventrally, first slightly laterally, second slightly laterally and recurved slightly posteriorly; dental ridge smooth; posterior canine well developed. Lower jaw with 2 prominent anterior canines, both as well as anterior canine of upper jaw exposed when mouth occluded; first canine noticeably shorter than second; first canine directed

anterodorsally, second canine directed laterally and curved posterolaterally; dental ridge smooth anteriorly, followed by 7 or 8 stout canines progressively increasing in length posteriorly. Vomerine teeth absent.

Dorsal fin spines subequal, pungent; pointed membrane behind tip of each spine attached just basal to and extending distinctly beyond spine tip, posterior tip of dorsal and anal fin narrowly rounded, posterior rays not produced; posterior tip of fins not reaching to posterior edge of hypurals. Dorsal and anal fins without basal sheath, 1–3 progressively smaller accessory scales adjacent to fin base. Caudal fin truncate, often with posterior margin slightly convex medially, dorsalmost rays 1.2 (0.9–1.1) times length of rays at centre of fin. Pectoral fin with dorsalmost ray very short, ventralmost ray distinctly longer than those immediately above, posterior edge of fin falcate, dorsoposterior corner bluntly pointed, posteroventral corner sharply pointed. Pelvic fin of moderate length, posterior tip of fin reaching to (to or nearly to) anus.

Reaches moderately small maximum size, largest specimen examined 138 mm SL.

Pigmentation in alcohol. Juveniles unknown. Adults uniformly pale except for dusky horizontal stripe about 1 scale wide from just below lateral line under 8th dorsal fin spine to just beyond posterior end of dorsal fin near top of caudal peduncle (fig. 44).

Fresh colours. Unknown.

Etymology. The new name *skaiopygmaeus* is a conjunction of the Greek adjectives *skaios* for "western" and *pygmaios* for "pygmy", in reference to the distribution of this dwarf tuskfish in the western Indian Ocean off Somalia.

Distribution. Known from only seven specimens acquired in two collections made off the Somali coast in the western Indian Ocean (fig. 40) at depths of about 25–60 m.

Comments. This species is clearly a member of the seven species complex characterised by a tiny first pectoral fin ray and falcate pectoral fin profile. Of the seven, it appears to be closest to *C. albofasciatus* and *C. sugillatum* in having a slightly deepter body and caudal peduncle. As the type series, comprising seven mostly faded specimens collected off Somalia in two tows on consecutive days in 1964, are apparantly the only extant collection specimens, nothing is known of life colours. Still, all lack persistent patterns characteristic of the two described species as well as others in the complex, like *C. gymnogenys* also known from the western Indian Ocean. *Choerodon skaiopygmaeus* is further distinguishable from the last by the more expansive scaled area on the cheek that reaches distinctly below the ventral margin of the eye. It is unclear if the slightly dusky stripe laterally on the side is homologous with similar markings on the side of *C. margaretiferus* specimens that are pearly in life, a colour feature of some species of the complex. Long preserved specimens of *C. albofasciatus* retain a similar marking that is pearly in life. The species lacks the dark slash-like marking of *C. sugillatum* and dark spot dorsally on the side of terminal phase *C. gomoni* and *C. margaritiferus*.

Choerodon sugillatum Gomon, 1987
Wedgetail Tuskfish

Figures 45, 46; table 5; appendix.

Choerodon sugillatum Gomon, 1987: 19, Queensland, Cape Bedford (Australia), 15° 13.59'– 15° 15.00' S, 145° 23.36'–145° 27.87' E.

Diagnosis. Dorsal fin rays XII, 8; anal fin rays III, 10; pectoral fin rays ii, 13, rarely 14, dorsalmost ray short 2.8–11.7% pectoral fin length, ventralmost ray distinctly longer than those immediately above, posterior edge of fin falcate, dorsoposterior corner bluntly pointed, posteroventral corner sharply pointed; body shallow, 29.3–37.7% SL, head depth 21.5–29.2% SL, caudal peduncle depth 10.0–12.8% SL; head blunt, dorsal profile of snout moderately steeply curved, snout length 8.0–10.6% SL; predorsal scales approximately 6 or 7, reaching forward on dorsal midline to midpoint between posterior extent of eye and posterior edge of preopercle; cheek with small partially embedded scales in about 6 diagonal rows, posteriormost with about 6 or 7 scales to upper extent of free preopercular edge, reaching forward to corner of upper lip crease above mouth, with very broad naked margin posteriorly and ventrally on preopercle; 2 rows of about 5–9 small scales (only 1 or 2 scales in second row when present) on subopercle adjacent preopercular edge extending forward to about anterior end of ventral preopercular margin; each lateral line scale usually with unbranched laterosensory canal tube; scales above lateral line about 2½ or 3; cephalic sensory canal pores moderately numerous confined to lines or short branches associated with major canals; second pair of canines in lower jaw directed dorsolaterally; dorsal and anal fins without basal sheath, 1–3 progressively smaller accessory scales adjacent to fin base; posterior lobe of dorsal and anal fins not quite reaching hypural crease; caudal fin truncate, posterior margin convex medially in adults, upper and lower corners pointed; pelvic fin not quite reaching anus, length 17.3–21.3% SL. (See Table 5 for additional meristic and morphometric ranges.) Olive above, white below with blue-edged black bar below lateral line under 3rd or 4th dorsal fin spine; blue lines anteroventral from eye, below and above eye and across pectoral fin base; caudal fin with darker, posteriorly tapering wedge-shaped patch centrally.

Reaches moderately small maximum size, largest specimen examined 149 mm SL.

Pigmentation in alcohol. Juveniles pale with dusky scale margins dorsally and prominent dusky stripe above lateral midline from opercular margin to distal caudal fin margin; darker mark on stripe below bases of second and third dorsal fin spines; centre of posterior caudal fin margin with small dark blotch; fins otherwise hyaline.Adults pale, slightly dusky dorsally, with prominent dark slash preceded by immaculate pale slash above and slightly behind pectoral fin base; narrow dark margin wrapping around dorsal edge of pectoral fin base; fins pale except for dark mark at centre of caudal fin's posterior margin.

Fresh colours. Juveniles generally similar to initial phase adults as described below with additional brown blotches dorsally; fins mostly transparent with 2 olive stripes in dorsal fin and 2 blue stripes in anal fin (Kuiter, 2010: 56, top B & C).

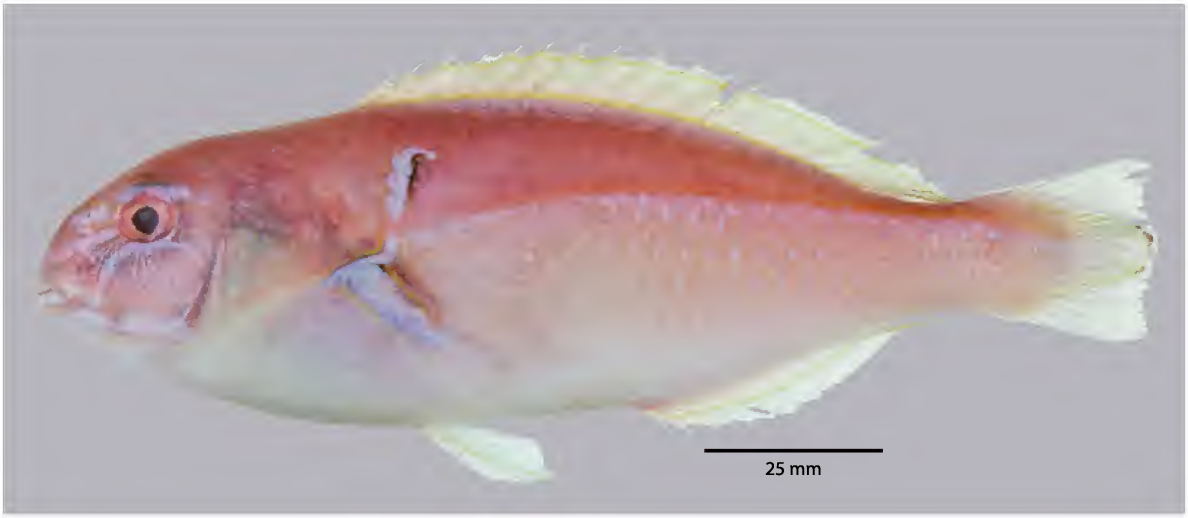

Figure 45. *Choerodon sugillatum*. Terminal phase adult, CSIRO H 3897-04, 135 mm SL, Pollard Channel, Great Barrier Reef, Queensland, Australia, 11° 51.51' S, 143° 27.83' E, photo by T. Carter, CSIRO.

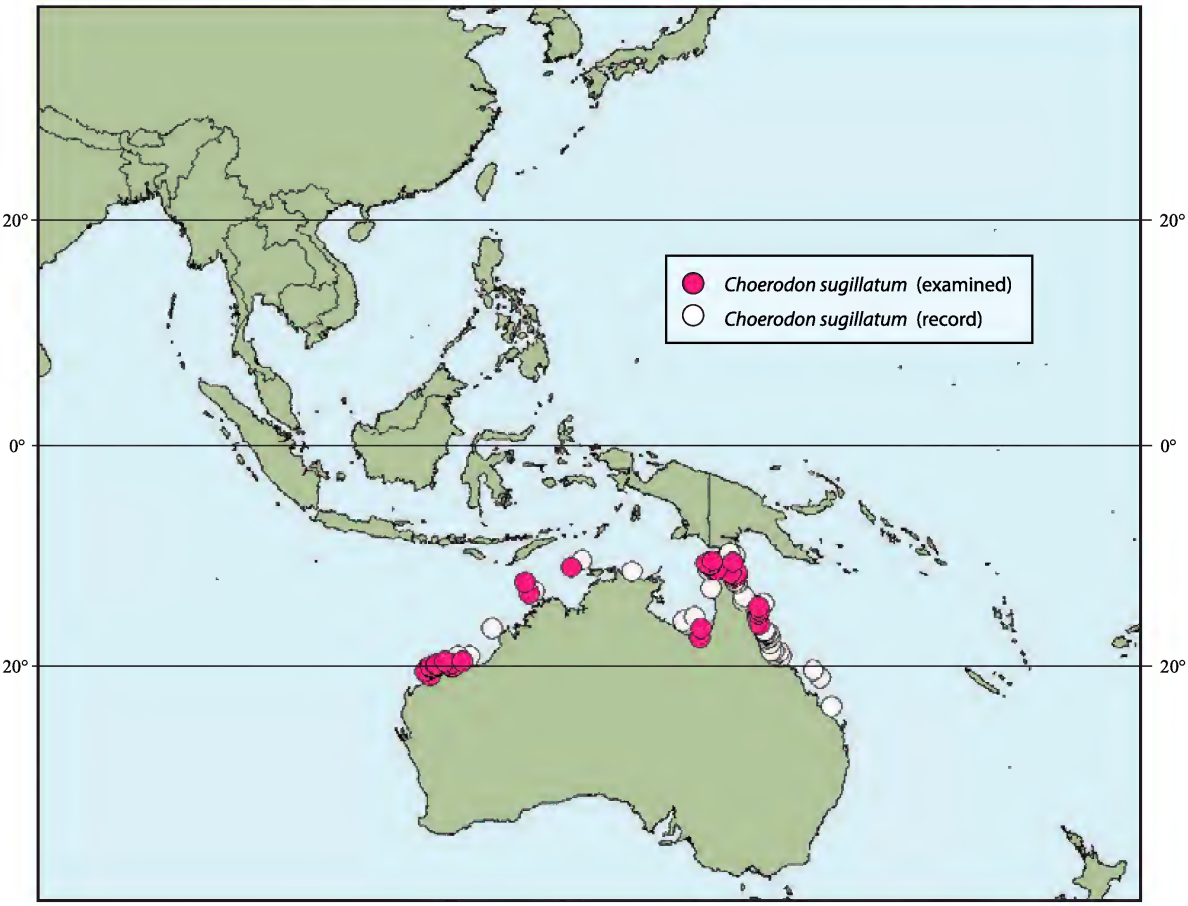

Figure 46. Distribution of *Choerodon sugillatum* based on specimens examined (coloured) and collection registration records (white).

Initial phase adults olive dorsally, white ventrally with narrow orange to brown stripe just above lateral midline from snout to base of tail, stripe broader with blue dorsal edge on head (fig. 45); scale centres blue, at least posteriorly, yellow streaks between scale rows on caudal peduncle; distinctive vertical black mark with blue anterior margin on midlateral stripe above and slightly behind pectoral fin base; 2 yellow edged blue lines directed anteroventrally from eye to upper jaw, 2 others crossing snout in front of eye, short blue line directed posteriorly from top and bottom of eye, lower line curving ventrally anteroventral to eye and continuing onto chin; blue stripe directed posteriorly from lower jaw to posterior edge of preopercle; lower lip blue; broad blue band with narrow yellow margins crossing pectoral fin base. Dorsal and anal fins blue, dorsal fin with thin yellow horizontal line proximally and distally; anal fin with thin yellow horizontal lines proximally and midlaterally; caudal fin blue with posteriorly converging yellow lines, lines edged with black posteriorly at centre of rear margin of fin. Pectoral and pelvic fins hyaline; pelvic fin with lengthwise yellow submarginal line near leading edge (Sainsbury & Kailola, 1984: 261, middle as *Choerodon* sp 2.).

Terminal phase adults similar to initial phase but pinker overall with narrower midlateral stripe and vertical blue line or spots on most scales on side. (Allen, 1985: fig 334, as *Choerodon* species; Kuiter, 2010: 56, top A)

Etymology. The name *sugillatum* is Latin for "black and blue", a reference to the characteristic marking on the side of this species.

Distribution. Restricted to northern Australia, extending at least from Cape Tribulation, Queensland to the Monte Bello Islands, Western Australia (fig. 46). Occurs on open sand with sparse algal cover, like *Caulerpa,* at depths of 10–120 m (Kuiter, 2010: 56).

Comments. Described from a series of specimens from both coasts of northern Australia (Gomon and Allen, 1987: 19, NMV A3126, 104 mm SL, holotype), *C. sugillatum* frequently features in the bycatch of northern Australian prawn fisheries. As a dark slash-like marking is present on the side above the lateral line in a number of species of this subgenus and at least one other apparently unrelated subgenus, it cannot be relied on alone for recognising this species. However, in combination with the crescentic pectoral fin, having a nub-like first fin ray, the features alone distinguish the species.

Material examined. 114 specimens, 35.3–149 mm SL; see appendix.

Choerodon zosterophorus (Bleeker, 1868)
Blackblotch Tuskfish

Figures 42, 47; table 5; appendix.

Choerops zosterophorus Bleeker, 1868: 273, pl. XII, Kei-major (Indonesia).

Choerops brenchleyi Günther, 1872: 424, Misol Island (Indonesia).

Diagnosis. Dorsal fin rays XIII, 7; anal fin rays III, 10; pectoral fin rays ii, 13, dorsalmost ray short 11.3–18.3% pectoral fin length, ventralmost rays shorter than those above, posterior edge of fin obliquely straight, dorsoposterior corner bluntly pointed, posteroventral corner angular; body shallow, 29.4–32.9% SL, head depth 19.8–27.0% SL, caudal peduncle depth 11.8–13.6% SL; head bluntly pointed, dorsal profile of snout moderately steep, snout length 9.5–11.6% SL; predorsal scales approximately 6–8, reaching forward on dorsal midline almost to midpoint between posterior extent of eye and posterior edge of preopercle; cheek with small partially embedded scales in about 8–12 diagonal rows, posteriormost with about 10 scales to upper extent of free preopercular edge, reaching forward to corner of upper lip crease above mouth, with broad naked margin posteriorly and ventrally on preopercle; 1 or 2 rows of about 8 small scales (only about 1 or 2 scales in second row when present) on subopercle adjacent preopercular edge extending forward near anterior end of ventral preopercular margin; each lateral line scale with multiple branching laterosensory canal tube; scales above lateral line about 2½ or 3; cephalic sensory canal pores mostly confined to lines or short branches associated with major canals; second pair of canines in lower jaw directed dorsolaterally and curved posterolaterally; dorsal and anal fins without prominent basal sheath, 1–3 progressively smaller accessory scales adjacent to fin base; posterior lobe of dorsal and anal fins not quite reaching hypural crease; caudal fin truncate; pelvic fin reaching just short of anus, length 19.8–22.4% SL. (See Table 5 for additional meristic and morphometric ranges.) Grey above, white below with broad yellow midlateral stripe, broad white stripe above it angled towards base of first few segmentd dorsal fin rays and marginal black blotch to stripe below posterior part of dorsal fin base; smaller white blotch on side at posterior end of dorsal fin base.

Reaches moderately small maximum size, largest specimen examined 153 mm SL.

Pigmentation in alcohol. Juveniles pale with dark blotch anteriorly at base of soft portion of dorsal fin. Initial phase adults pale with stark white anteriorly tapering stripe on side from base of last few dorsal fin spines to just above pectoral fin base. Dark blotch on dorsal fin at base of anteriormost four or five rays extending as tapered spot to about midside along posterior margin of white stripe. Terminal phase adults as initial phase with tapered end of dark blotch extending to posterior side of pectoral fin base and blotch extending equal distant along anterodorsal margin of white stripe.

Fresh colours. Juveniles pale grey above, white ventrally with broad yellow to orange midlateral stripe with white stripe immediately above interrupted below posterior part of dorsal fin by dorsal expansion of yellow/orange stripe and black blotch on dorsal apex at boundary between side and dorsal fin base (fig. 47A); brown blotch at posterior end of caudal peduncle with small black spot at centre of caudal fin base; fins hyaline (Kuiter, 2010: 65, fig. B).

Initial phase adults grey dorsally, white ventrally with broad yellow mostly horizontal band from cheek to below rear end of dorsal fin; prominent pearly, silvery or white oblique

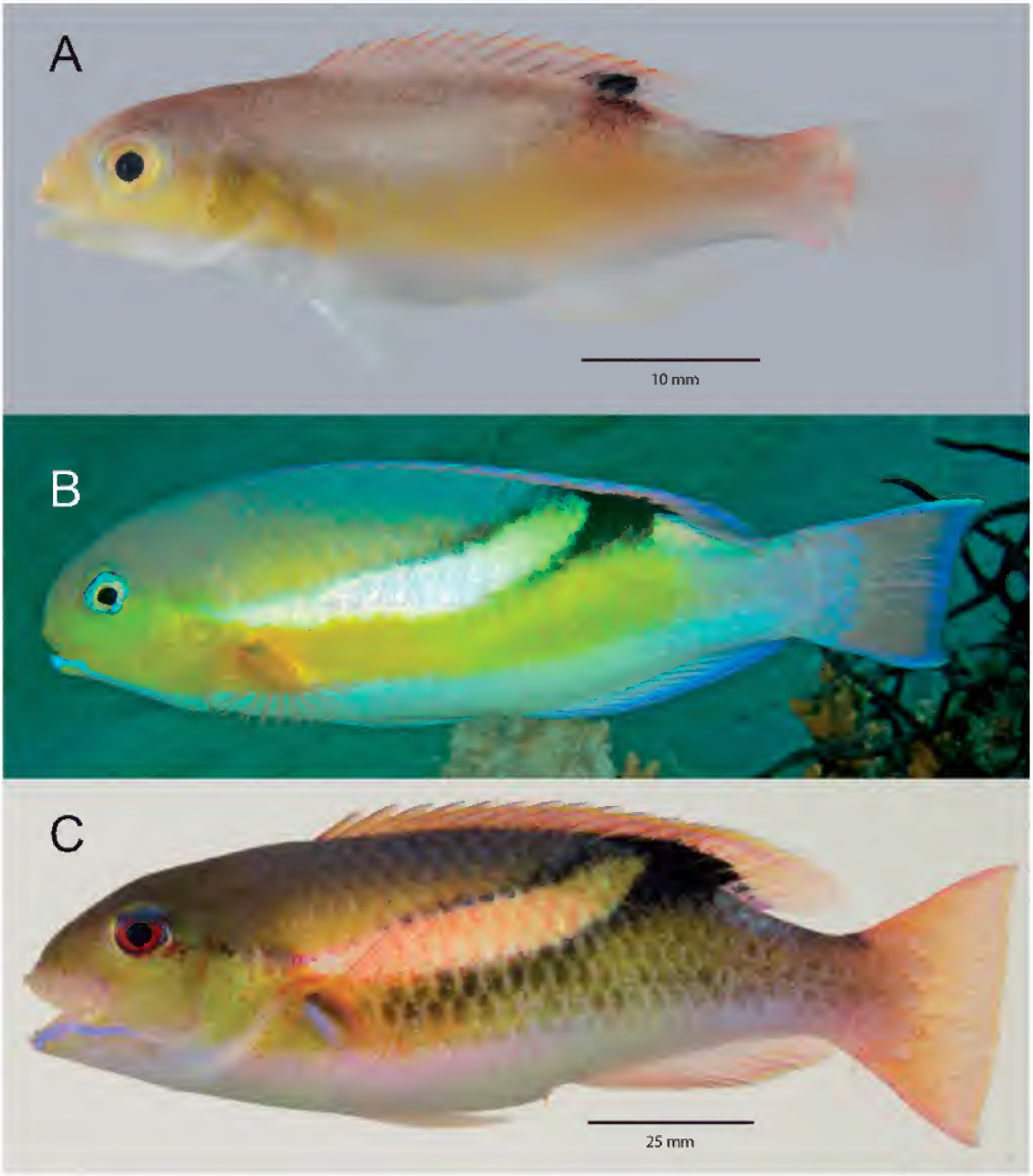

Figure 47. *Choerodon zosterophorus*. A, Juvenile, USNM 436349, 43 mm SL, Oriental Mindoro, Puerto Galera, Philippines, photo by J. Williams, USNM; B, Initial phase adult, Puerto Galera, Oriental Mindoro, Philippines, photo by P. Ryan; C, Terminal phase adult, USNM 378714, 124 mm SL, Buyallao Island off SE Mindoro, Philippines, photo by J. Williams, USNM.

stripe on dorsal edge of yellow band from above pectoral fin base to below last few dorsal fin spines (fig. 47B); large black blotch posterior to upper end of pale stripe, extending onto bases of first few segmented dorsal fin rays, in small individuals, black band extending anteroventrally along posterior edge of pale band in larger adults; moderately small white blotch posterior to black blotch below last few segmented dorsal fin rays in smaller adults. Fins grey to hyaline; dorsal, anal and caudal fins with narrow blue margins (Kuiter, 2010: 65, figs C–E; Allen & Erdmann, 2012: 649, bottom).

Terminal phase adults similar to initial phase but with black blotch extending forward as anteriorly tapering stripe towards forward end of white stripe (fig. 47C); additional white blotch dorsoposteriorly absent (Kuiter, 2010: 65, fig. A).

Etymology. The name *zosterophorus* is from the Greek *zoster* for "belt" or "girdle" and *phaeos*, *phiaros* or *phos* for "light, bright or shining", in reference to the distinctive oblique bright white stripe angled across the side of this species.

Distribution. Apparently restricted to the Philipines north to at least Caban Island, Batangas in Luzon, eastern Indosnesia at least as far west as Lombok and Papua New Guinea (fig. 42). Like its cognate *C. jordani*, this species occurs on semi-open sandy substrates along reefs, often in deep channels to lagoons that are prone to strong tidal currents, particularly with soft corals, at depths of 10–40 m (Kuiter, 2010: 65; Allen & Erdmann, 2012: 649).

Comments. Bleeker (1868: 273) based his description of *Choerops zosterophorus* on a 170 mm specimen from Kei-major (Great Kei Island, Indonesia). A 157 mm TL specimen in the Rijksmuseum (RMNH 6537: 131 mm SL; Eschmeyer, 2015, gives RMNH 6533 as the type) is slightly smaller than the given length but has been cut open, presumably for the examination of the pharyngeals, and may be Bleeker's specimen. It otherwise agrees with the description. Günther's *Choerops brenchleyi* (1872: 426, 1873: pl. 34) was based on a specimen stated to be 7½ inches (about 188 mm TL) from Misol Island. Three specimens in the British Museum collection are registered as types from this locality (Eschmeyer, 2015). The largest (BMNH 1870.8.31.27, 153 mm SL, 184 mm TL) is close to that length and is here regarded as the lectotype, if not holotype. The original description gives no indication that it was based on more than one specimen. The species is conspecific with *C. zosterophorus*.

As described above, *C. zosterophorus* is closely related to the very similar *C. jordani*, but easily distinguished by colour pattern at adult sizes. Small juveniles are much more alike (figs 40A & 45A).

Material examined. 9 specimens examined, 44.7–153 mm SL; see appendix.

Incertae Sedis

Labrus chlorodus Gray, 1854 (p. 80, no locality), a name historically associated with the genus *Choerodon*, was based on a description compiled by Gronow and published along with descriptions of other species in Gronow's collection by Gray long after Gronow's death. *Labrus chlorodus* was subsequently referred to *C. anchorago* by Günther (1862), Fowler and Bean (1928) and Herre (1953: 647). Although the description does match *C. anchorago*, it fails to mention a diagnostic character that would distinguish it from not only other species of the genus but a number of other labrids, such as those in the genus *Cheilinus*. Since the type has not been located in the collection of the British Museum (Natural History) or elsewhere, the status of the name is considered unresolved.

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Appendix

Specimens on which species treatments are based, apart from newly described species, are listed below and arranged alphabetically by species. Where a registration lot comprises a single specimen, only the length is provided; where lengths were not recorded, the numbers of specimens are presented; question marks (?) indicate specimen lots taken from registration lists for which the number of specimens and their lengths were not obtained. Registration lots comprising specimens for which morphological data featuring in descriptions and tables were recorded are marked with an asterisk (*); those taken from museum registration lists for which identities were not verified but feature in distribution maps as white symbols are indicated by a dagger sign (†). Descriptive localities in material sections are edited to reduce the word count because most have latitude and longitude coordinates that convey greater accuracy. Readers seeking additional collection information are referred to the museums housing the relevant specimens or to their web-based resources.

Choerodon albofasciatus nom. nov. (11 specimens examined, 96.7–152 mm standard length [SL]). **Japan, *Okinawa***: URM-P 04294* (146) Naha fish market, 7 September 1982; URM-P 18569* (152) Naha fish market, 29 December 1986; URM-P 31237* (148) Naha fish market, 24 February 1994; URM-P 31276* (146) Naha fish market, 4 March 1994; URM-P 39636* (121) Naha fish market, 18 December 1998; **Taiwan**: THUP 00750* (133); THUP 00976* (141); THUP 03355* (136). **Indonesia**: CSIRO H 7220-04* (136) Lombok, Tanjung Luar fish market, 8° 48" S, 116° 29" E, 5 November 2010. **Australia, *Western Australia***: CSIRO H 6452-05* (96.7) W of Shark Bay, 25° 54.13" S, 112° 49.74" E–25° 54.38" S, 112° 49.62" E, 100–95 m, 7 December 2005, FRV Southern Surveyor, beam trawl, SS1005/116; NMV A1784* (117) Shark Bay, 27° 33" S, 113° 14" E–27° 25" S, 113° 11" E, 109–128 m, 2 March 1981.

Choerodon anchorago. (163 specimens examined, 12–273 mm SL) MNHN A.8208* (273, holotype of *Labrus macrodontus*, skin) unknown locality; RMNH 6530* (47.3) unknown locality. **INDIAN OCEAN, Nicobar Islands**: AMS B.8221 (181) Day, 1865. **Andaman Islands**: BMNH 70.5.18.80 (104) Andaman Islands. **PACIFIC OCEAN, Japan**: BPBM 7253 (138) Ryukyu Island, Ishigaki. **Vietnam**: MNHN A8891 (2, ~125–180) Poulo-Condore Islands, 8° N, 107° E; MNHN A8892 (2, ~48–68) Poulo-Condore Islands, 8° N, 107° E. **Malaysia**: USNM 35717 (1) Sarawak, Sadong. **Singapore**: ANSP 83277 (1); CAS 303771 (1); MCZ 14375 (3, 13–175). **Philippines**: AMS I.21901-015* (2, 74.7–80.0) Bolinao, 16° 25" N, 119° 53" E, 16 April 1980; AMS I.31430.039† (1) Dumaguete, 9° 20" N, 123° 18" E, 16 April 1986; AMS I.31430-009† (203) Dumaguete, 9° 20" N, 123° 18" E, 16 April 1986; AMS I.31431.004† (1) Negros, Bais, 10° N, 122° E, 22 August 1986; AMS I.31431-002† (112) Negros, Bais, 10° N, 122° E, 22 August 1986; AMS I.40150-011† (2) Mindoro Island, San Jose, 12° 19" 40" N, 121° 05" 16" E, 31 May 2000; ANSP 33254 (1) Luzon, Bacin; BPBM 14215 (2, 106–109) Sulu Archipelago, Tapau Island; CSIRO H 4132-10 (93 SL) Bolinao, 7 October 1995; NSMT-P 120137* (99.2) Cebu, Mactan Island, Lapu-lapu fish market, 16 October 1988; USNM 56078 (1) Luzon; USNM 58030 (2) Zamboanga; USNM 112253 (1) Palawan; USNM 126414 (1) Racon; USNM 152153 (2) Tilig; USNM 152169* (202) Luzon, Pt Jamelo; USNM 152171 (1) Alimango; USNM 152172 (1) Alamango Bay; USNM 152173* (221) Mindoro, Varadero Bay; USNM 152174 (1) Mindanao; USNM 152175 (1) Jolo; USNM 152176 (1) South Tumindao; USNM 152177* (230) Little Santa Cruz Island; USNM 152178 (2) Masbate; USNM 152179 (1) Cebu; USNM 152339 (1) Balabac; USNM 152341 (1) Tataan; USNM 153471 (1) Cebu; USNM 153472* (254) Romblon, Romblon Reef; USNM 153473 (1) Juanico Strait; USNM 153474 (1) Mindanao, Puiada Bay; USNM 153478 (236) Little Santa Cruz Island; USNM 153479 (1) Tataan; USNM 153481 (1) Mindanao, Iramucan Bay; USNM 153541 (1) Masbate Reef; USNM 153542 (2) Palawan, Endeavour Strait; USNM 153543 (1) Mindoro, Sablayan; USNM 153544 (1) Jolo; USNM 153545 (1) Pangasinan Island; USNM 153546 (1) Burias Island, Busin Harbor; USNM 153547 (1) Luzon, Alibijaban Island, Ragay Gulf; USNM 153548 (3) Ulugan Bay; USNM 153549 (1) Zamboanga, Little Santa Cruz Island; USNM 153550 (1) Mindoro, Galera Bay; USNM 153551 (1) Cataingan Bay; USNM 153632 (1) Cebu; USNM 153477 (1) Cataingan; USNM 153480 (1) Lubana Island, Tilig; USNM 153482 (219) Libani Bay, Kait Point; USNM 153534 (1) Jolo Island; USNM 153535 (2) Caxisagan Island; USNM 153536 (3) Tacao Island, San Miguel Harbor; USNM 153537 (5) Palawan, Bolalo Bay; USNM 153538 (2) Jolo Island; USNM 153539 (1) Point Palapag; USNM 153540 (1) Mindoro, Mansalay; USNM 153632 (1) Cebu; USNM 153845* (208) Luzon, Alibijaban Island, Ragay Gulf. **Palau**: BPBM 7436 (~150) Ein Malk; BPBM 9382 (2, 40–42) Arakubisan Island; BPBM 9474 (126) Urukthayal; BPBM 9475 (147) Iwayama Bay; NSMT-P 46217* (108) Iwayama Bay, 1 m, 16 June 1980; NSMT-P 46226* (71.1) Urukthapal Island, 1 m, 23 June 1980. **Yap**: NSMT-P 46225* (89.7) Inuf, 1 m, 30 June 1980. **Guam**: USNM 113627* (6, 32.8–107) Namru; USNM 152340 (1) Apra Bay. **Caroline Islands**: USNM 113628 (1) Yap. **Solomon Islands**: AMS I.15767-021* (165) Inia Atoll, off Baga Island, 7° 45" S, 157° E, 1970; AMS I.22128-148* (126) New Georgia Island, 8° 18" S, 157° 15" E, 5 m, December 1980; BMNH 76.5.1.21 (191) Yap, Duke of York Group; BPBM 1308 (178) Shortland; BPBM 15565 (2, 22–25) Guadalcanal; CSIRO C 418 (264 TL) Mioko Island, 4° 15" S, 152° 28" E, 29 October 1949. **Vanuatu**: ANSP 77780 (1) Fate. **Indonesia**: AMS I.12543† (1) Aru Islands, Dobo, 1912; BMNH 1864.5.15.18* (34.3, type of *Crenilabrus leucozona*?); CSIRO H 7853-03* (158) Lombok, Tanjung Luar, 8° 48" S, 116° 29" E, 25 October 2008; CSIRO H 7853-04* (220) same collection information as CSIRO H 7853-03; CSIRO H 7853-05* (221) same collection information as CSIRO H 7853-03; CSIRO H 7899-01 (137) Bali, Kedonganan, 8° 45" S, 115° 09" E, 21 October 2008; CSIRO H 7899-02* (149) same collection information as CSIRO H 7899-01; CSIRO H 7899-04* (213) same collection information as CSIRO H 7899-01; NMV A 31429-001* (208) same collection information as CSIRO H 7899-01; CSIRO H 7985-01* (146) same locality as CSIRO H 7899-01, 2 March 2009; MCZ 30510 (138) Sulawesi, Macasser; MCZ 14372 (9, 84.4–179) Java; MZB 23111 (96.7) same locality as CSIRO H 7899-01, 14 July 2008; MZB 23112* (141) same collection information as CSIRO H 7853-03; NMV 46063* (196); NTM S.10741-001 (211) Bali, 8° 40" 59" S, 115° 15" 00" E, September 1981; NTM S.11163-005 (123) Bali, Denpasar, 8° 04" 01" S, 115° 13" 59" E, 4 April 1984; QMB I.20 (105, syntype of *Choerodon weberi*) Aru Islands, Dobo; QMB I.1532 (159, syntype of *Choerodon weberi*) Aru Islands, Dobo;

QMB I.10133 (92.8, syntype of *Choerodon weberi*) Aru Islands, Dobo; RMNH 10892 (140) Sleyer Island; SMBL 2759* (263, holotype of *Choerops meleagris*) Mare Javanicum; USNM 153482* (219) Sulawesi, Libani B., Kait Point; USNM 438444 (234) Pulau Seribu, Pulau Kongsi, 5° 51" S, 106° 36" E, 5 April 1974; WAM P.31305-004† (73) Riau Islands, Bintan Island, 1° 11" N, 104° 19" E, 13 May 1997. **Timor-Leste**: AMS I.46112.044† (1) Dili, 8° 32" 53" S, 125° 35" 15" E, 18 September 2012; AMS I.46112-043† (165) Dili, 8° 32" 53" S, 125° 35" 15" E, 18 September 2012; RMNH 2361 (200) Timor; SMF (263, holotype of *Choerops meleagris*, mount) Java Sea. **Papua New Guinea**: AMS IB.4656* (149) 1960; AMS IB.4657* (138) 1960; AMS I.12543 (106) Aru Islands, Dobo; ANSP 133156* (117) Keraward Island; BPBM 15809 (123) New Guinea Island, Madang, 14 August 1973; CSIRO C 1810 (225 TL) Port Moresby, 21 November 1948; NMV A18465* (3, 165–187) April 1881; NTM S.13666-031 (3, 12–63) Madang, 5° 09" 00" S, 145° 48" 00" E, 7 October 1992; QMB I.20 (105, syntype of *Chorodon weberi*) Aru Islands, Dobo; QMB I.1532 (159, syntype of *Chorodon weberi*) Aru Islands, Dobo; QMB I.10133 (92.8, syntype of *Chorodon weberi*) Aru Islands, Dobo. **Admiralty Islands**: USNM 114810 (3) Los Negros. **Australia, *Queensland:*** AMS I.19461-017* (64.8) Decapolis Reef, 14° 51" S, 145° 17" E, 2–4 m, 14 November 1975; AMS I.20773-052* (3, 52.5–65.2) Nymph Island, 14° 39" S, 145° 15" E, 1–2 m, 6 December 1978; BMNH 1861.6.11.11(220, skin) Hope Island, 27 October 1860; BPBM 15967 (70) Port Douglas; QMB I. 1691† (?) Pipon Island, off Cape Melville, 14° 7" S, 144° 31" E; QMB I. 6454† (?) Pencil Bay, Palm Island, 18° 46" S, 146° 34" E; QMB I. 9907† (?) Dunk Island, 17° 57" S, 146° 9" E; QMB I. 11372† (?) Palm Group, 18° 40" S, 146° 33" E; QMB I. 25993† (?) Green Island, off Cairns, 16° 46" S, 145° 58" E, 24 February 1988; QMB I. 26944† (?) Flinders Island, Princess Charlotte Bay, 14° 10" S, 144° 15" E, 1 October 1990.

Choerodon azurio. (40 specimens examined, 24.1–308 mm SL). **Unknown locality, China**: BMNH 1851.12.27.376* (234, skin) Warwick; BMNH 1968.3.11.26* (231, skin) J. R. Reeve Collection; BMNH 1968.3.11.27* (264, skin) #282, J. R. Reeve collection; CAS 61193 (1) Hong Kong; NSMT-P 55131* (198) S coast of Hainan Island, Sanya Bay fish market, 27 February 1997; NSMT-P 60849* (129) S coast of Hainan Island, Sanya Bay fish market, 27 November 1997; USNM 153420* (93.1) Hong Kong; MCZ 14376 (182). **Japan**: ANSP 26203 (1) Nagasaki, Hizen; BPBM 5814 (268) Tokyo; BPBM 6524 (235) Shirahama; CAS 7046 (1); NSMT-P 18960 (24.1) Honshu, Boso Peninsula, off Chikura, 38° 58.5" N, 140° 1.3" E, 48 m, 13 November 1973; NSMT-P 19134 (83.9) Izu, 40 m, 28 November 1968; NSMT-P 72357* (226) Hyogo Prefecture, Shinonsen-chou Humasaka, off Kanaya, 24 October 2005; NSMT-P 77942* (2, 105–117) Kochi Prefecture, Kochi City, Mimase fishing port, 8 January 2000; NSMT-P 81036* (2, 122–126) Shizuoka Prefecture, Suruga Bay, Masaki Lighthouse, 28 May 1994; NSMT-P 95917* (146) Kochi Prefecture, Tosashimizu City, Kubotsu fish market, 23 July 2009; USNM 22601* (308) Awa; USNM 50240 (1) Nagasaki; USNM 57488 (1) Tsushima; USNM 57584 (1); USNM 57669* (260); USNM 59691 (1) Hamashima; USNM 59807* (274) Kochi; USNM 61665* (218) Tokyo; USNM 71219 (2) Shimizu; USNM 713579 (2) Shimizu; USNM 71584 (1) Kagoshima; USNM 71800 (2) Misaki. **Taiwan**: CAS 7980 (1); THUP 2527* (58.6); THUP 2589* (58.9); THUP 3360* (69.6). **Vietnam**: MNHN 1965-232 (~170) Nha Trang.

Choerodon cauteroma. (46 specimens examined, 20–259 mm SL) **Australia, *Western Australia*:** AMS I.21603-002 (163) North West Shelf, 18° 25" S, 118° 52" E, 18° 25" S, 118° 49" E, 150–154 m, 17 May 1979; AMS I.26373-001* (2, 136–205, paratype) Shark Bay, 26° 00" S, 113° 30" E, 8 July 1962; BPBM 30944* (110, paratype of *Choerodon cauteroma*) same locality as AMS I.26373-001, May 1964; CSIRO A 1379 (62.2) Shark Bay, Denham Sound, 25° 43" S, 113° 15" E, August 1955; CSIRO C 507 (148) Shark Bay, Carnarvon, Cape Ronsard, 12.6–14.4 m, 7 September 1948; CSIRO C 2423 (100) Hampton Harbour, 5.4 m; CSIRO C 2511 (89.6) Exmouth Gulf, 22° S, 114° E, 1954; CSIRO C 2683 (130) Exmouth Gulf, 22° S, 114° E, 1952; CSIRO C 3871 (99.1) Exmouth Gulf, Giralia Bay, 6 September 1966; CSIRO CA 256 (259) E Monte Bello Islands, 11 May 1978; CSIRO CA 2155 (221) Monte Bello Islands, 20° 17.0" S, 116° 04.0" E–20° 17.0" S, 116° 00.0" E, 51–52 m, 31 May 1980; CSIRO CA 2156 (154) Port Hedland, 19° 36.0" S, 118° 37.0" E–19° 38.0" S, 118° 40.0" E, 36 m, 4 June 1980; CSIRO CA 2157 (206) Port Hedland, 19° 36.0" S, 118° 37.0" E–19° 38.0" S, 118° 40.0" E, 36 m, 4 June 1980; CSIRO CA 2160 (179) Monte Bello Islands, 20° 15.0" S, 115° 56.0" E, 20° 17.0" S, 115° 55.0" E, 48–50 m, 27 May 1980; CSIRO H 659-1 (176, paratype) Dampier Archipelago, Cape Preston, 20° 48.0" S, 116° 00.0" E–20° 46.0" S, 115° 59.0" E, 19–22 m, 1 December 1979; CSIRO H 4043-01† (320) Port Hedland, 19° 45.8" S, 117° 57.7" E–19° 46.7" S, 117° 58.5" E, 46–48 m, 2 September 1995; CSIRO H 4101-01† (1) Point Samson, 20° S, 117° E, September 1995; CSIRO H659-01* (176, paratype of *Choerodon cauteroma*) Exmouth Gulf, October 1974; CSIRO H 7198-31 (2, 108–128) Shark Bay, Carnarvon, 25° 20" S, 113° 30" E, 30 m, 25 May 1995; NMV A1918 (212) NW of Dampier, 20° 07" S–20° 02" S, 116° 12" E–116° 08" E, 60 m, 9 March 1981; NMV A3819* (4, 114–208, paratypes of *Choerodon cauteroma*) same collection data as AMS I.26373-001; NTM S.10574-006 (212) Dampier Archipelago, 20° 03" 00" S, 115° 47" 60" E, 54 m, 7 May 1982; NTM S.11688-002 (150) North West Shelf, King Sound, 16° 31" 59" S, 121° 25" 59" E, 42 m, 17 April 1985; NTM S.17058-002 (157) North West Shelf, Bedout Island, 19° 22" 59" S, 118° 28" 01" E, 70 m, 25 January 1984; USNM 280629* (2, 115–158, paratypes of *Choerodon cauteroma*) same collection data as AMS I.26373-001; WAM P.21277-001† (1) Dampier Archipelago, Elphick Knob, 20° 28" S, 116° 37" E, 6 November 1971; WAM P.22960-001† (1) Dampier Archipelago, Elphick Knob, 20° 28" S, 116° 37" E, 5 November 1971; WAM P.22959-001† (1) Dampier Archipelago, Kendrew Island, Museum Beach, 20° 29" S, 116° 32" E, 17 February 1973; WAM P.5701-001† (1) Shark Bay, 25° 21" S, 113° 44" E, September 1960; WAM P.23092-001 (3, 20–40) Dampier Archipelago, Elphick Knob, 20° 28" S, 116° 37" E, 26 November 1971; WAM P.24259-001* (195, paratype) Dampier Archipelago, Kendrew Island, 20° 29" S, 116° 32" E, 24 February 1974; WAM P.25095-038* (6, 98–144, paratypes) Exmouth Gulf, 22° 05" S, 114° 15" E, 0–12 m, October 1974; WAM P.25372-001* (3, 90–104, paratypes) Exmouth Gulf, 21° 55" S, 114° 09" E, 4–5 m, 1 July 1975; WAM P.25508-042* (203, holotype) Exmouth Gulf, 21° 57" S, 114° 12" E, 20–30 m, 6 December 1975; WAM P.30083-006† (29) Shark Bay, Cape Ransonnet, 26° 09" S, 113° 13" E, 4–5 m, 30 March 1990; WAM P.30087-009 (2, 44–49) Shark Bay, Useless Loop, 26° 09" S,

113° 26" E, 0.5–1.5 m, 2 April 1990; WAM P.30239-005† (2, 110–125) Exmouth Gulf, 22° 15" 00" S, 114° 20" 00" E, 24 March 1991; WAM P.31391-023† (3, 12–15) Beagle Bay, 16° 59" S, 122° 40" E, 9–10 m, 28 September 1997; WAM P.32317-008 (133) Shark Bay, Cape Peron North, 25° 22.558" S, 113° 17.597" E, 11.5–11 m, 7 October 2002.

Choerodon cephalotes. (198 specimens examined, 29.1–253 mm SL). **Australia,** ***New South Wales:*** AMS I.25419-001* (107, holotype of *Choerops macleayi*, formerly F.860A) Port Jackson, 33° 50" S, 151° 15" E, 1984. ***Queensland***: AMS E.1471 (237) Double Island Point, 26° 25" S, 153° 30" E, 60 m, 28 June 1910; AMS E.1530 (139) Wide Bay, 25° 52" S, 153° 07" E, 1909; AMS E.1657 (158) Fraser Island, 25° 23" S, 153° 12" E, 27 m, 29 June 1910; AMS E.1658 (183) same collection data as AMS I.1657; AMS E.2601 (5, 92–190) Hervey Bay, 25° S, 152° E, 20 m, 27 July 1910; AMS E.2602* (5, 96.4–150) same collection data as AMS I.2601; AMS E.2603 (5, 105–168) same collection data as AMS I.2601; AMS E.2604 (5, 95–167) same collection data as AMS I.2601; AMS E.2605 (5, 85–143) same collection data as AMS I.2601; AMS E.2606 (4, 88–144) same collection data as AMS I.2601; AMS E.2885 (133) Rock Cod Shoal, Bustard Head Light, 23° 52" S, 151° 37" E, 31 m, 9 August 1910; AMS E.2927 (165) Hervey Bay, 24° S, 152° E, 20 m, 27 July 1910; AMS E.2929 (2) same collection data as AMS I.2927; AMS E.2930 (2) same collection data as AMS I.2927; AMS E.2931 (6) same collection data as AMS I.2927; AMS I.10934 (180) Double Island Point, 26° 00" S, 153° 00" E, 28 June 1910; AMS I.10990 (173) Wide Bay, 25° 52" S, 153° 07" E, 1910; AMS I.15421-023 (100) Townsville, Magnetic Island, 19° 10" S, 146° 50" E, 1968; AMS I.15557-203 (8, 84.1–162) Gulf of Carpentaria, 17° 25" S, 140° 10" E, 10.1 m, 27 November 1963; AMS I.18248-001 (160) locality unknown, 1909; AMS I.20751-007 (5, 70.1–139) Lizard Island, 14° 38" S, 145° 24" E, 25 m, 8 February 1979; AMS I.20752-011 (2, 108–120) Lizard Island, 14° 30" S, 145° 22" E, 20 m, 8 February 1979; AMS I.20753-007* (10, 48.2–78.0) Nymph Island, 14° 36" S, 145° 14" E, 14–15 m, 8 February 1979; AMS I.20771-067 (4, 89.1–134) Cape York, Capt. Billy Creek, 11° 37" S, 142° 56" E, 16–18 m, 18 February 1979; AMS I.20771-092† (134) same collection data as AMS I.20771-067; AMS I.20827-008 (2, 92.0–102) Cape York, Hannibal Island, 11° 33" S, 142° 57" E, 22–23 m, 15 February 1979; AMS I.20829-001 (2, 99.7–103) Lizard Island, Decapolis Reef, 14° 50" S, 145° 15" E, 8 m, 25 February 1979; AMS I.27745-009 (100) Silkwood, 17° 45" S, 146° 01" E, 1925; AMS I.34301-051* (3, 50.4–85.9) Shoalwater Bay, Sabina Point, 22° 23" 45" S, 150° 18" 14" E, 0.3 m, 14 September 1993; AMS I.34318-055 (29.1) Townshend Island, 22° 12" 14" S, 150° 28" 32" E, 0.2 m, 16 September 1993; AMS I.9490 (105) Wide Bay, 25° 52', 153° 07" E, 1908; AMS IA.6724* (100) Lindeman Island, Kennedy Sound and Shaw Island, 20° 27" S, 149° 03" E, 1936; AMS IA.6783 (2, 42.5–102) Lindeman Island, 20° 27" S, 149° 02" E, 1936; AMS IB.1037 (16) Fraser Island, 24° 52" S, 152° 48" E, 27 m, 14 September 1938; AMS IB.1156 (160) same collection data as AMS IB.1037; AMS IB.5875 (99.6) Townsville, 19° S, 146° E, 1962; BMNH 1871.9.13.68 (115) Point Bower; CSIRO A 774 (47.1) Fraser Island, 26° S, 150° E, 4 September 1947; CSIRO C 3260 (137) Gulf of Carpentaria, Mornington Island, 16° 34.0" S, 139° 56.4" E, 29 m, 29 August 1963; CSIRO C 3280 (121) Gulf of Carpentaria, Nicholson River, 17° 22.7" S, 139° 40.4" E, 5.4 m, 20 August 1963; CSIRO C 3281 (118) Gulf of Carpentaria, Nicholson River, 17° 22.7" S, 139° 40.4" E, 5.4 m, 20 August 1963; CSIRO C 3315 (129) Gulf of Carpentaria, 16° 52" S, 140° 55" E, 10.8 m, 5 August 1963; CSIRO C 3341 (108) Gulf of Carpentaria, 17° 02" S, 139° 55" E, 13 August 1963; CSIRO C 3368 (102) Gulf of Carpentaria, 16° 59" S, 139° 50' E, 14.4 m, 12 August 1963; CSIRO C 3369 (107) Gulf of Carpentaria, 16° 59' S, 139° 50' E, 14.4 m, 12 August 1963; CSIRO C 3402 (104) Gulf of Carpentaria, Wellesley Islands, 16° 38.7' S, 140° 05.1' E, 25.2 m, 28 August 1963; CSIRO C 3428 (111) Gulf of Carpentaria, 16° 29' S, 140° 03' E, 27.0 m, 2 September 1963; CSIRO C 3447 (135) Gulf of Carpentaria, Pisiona Island, 25.2 m, 2 September 1963; CSIRO C 4044 (125) Gulf of Carpentaria, Karumba, 16° 24.8' S, 140° 58.0' E, 12.6 m, 24 August 1963; CSIRO C 4169 (112) Gulf of Carpentaria, between Sweers and Bountiful islands, 16° 52' S, 139° 45' E, 14 m, 5 November 1971; CSIRO C 4563 (121) Gulf of Carpentaria, 30 miles NW of Fairway Buoy, 16 m, 30 October 1972; CSIRO CA 773† (89 TL) Torres Strait, Thursday or Prince of Wales islands, 10° 40' S, 142° 15' E, April 1979; CSIRO H 3305-03 (120) Shelburne Bay, 11° 48.8' S, 143° 12.8' E–11° 47.2' S, 143° 11.0' E, 31 m, 14 January 1993; CSIRO H 3307-11 (2, 105–106) Hannibal Island, 11° 41.7' S, 143° 00.9' E–11° 43.7' S, 143° 01.7' E, 17 m, 14 January 1993; CSIRO H 3355-09† (156) Prince of Wales Island, 10° 50.6' S, 141° 12.7' E–10° 51.7' S, 141° 11.2' E, 27 m, 3 February 1993; CSIRO H 3896-01† (232) Cape Grenville, 11° 42.06' S, 143° 38.86' E–11° 41.85' S, 143° 37.38' E, 29 m, 28 October 1994; CSIRO H 5958-08 (104) Cape Flattery, 14° 48.5' S, 145° 15.4' E, 18 m, 11 May 2002; CSIRO H 6756-11 (137) NE of Bundaberg, 24° 21.35' S, 152° 40.28' E, 14 April 2004; CSIRO H 6893-09 (2, 125–136) Palm Islands, 18° 32' S, 146° 34' E, 31 m, 27 November 2003; CSIRO H 7676-04 (82) W of Northumberland Islands, 21° 35.12' S, 149° 42.53' E, 28 April 2004; CSIRO H 7895-01 (149) Torres Strait, E of The Three Sisters, 10° 15.51' S, 142° 55.60' E, 12 January 2004; NMV A13308 (88.0) 18 km W of Saunders Island, 11° 41' 42.00" S, 143° 00' 53.99" E, 18–17 m, 14 January 1993; NMV A13309 (104) 18 km W of Saunders Island, 11° 41' 42.00" S, 143° 00' 53.99" E, 18–17 m, 14 January 1993; NMV A13310 (186) Gulf of Carpentaria, 114 km W of Prince of Wales Island, 10° 50' 35.99" S, 141° 12' 42.00" E, 27 m, 3 February 1993; NMV A13311 (151) Gulf of Carpentaria, 109 km W of Prince of Wales Island, 10° 49' 12.00" S, 141° 09' 18.00" E, 29 m, 3 February 1993; NMV A13312 (180) Gulf of Carpentaria, 70 km W of Weipa, 12° 39' 06.00" S, 141° 12' 54.00" E, 40 m, 22 January 1993; NMV A13313 (122) Gulf of Carpentaria, 114 km W of Prince of Wales Island, 10° 50' 35.99" S, 141° 12' 42.00" E, 27 m, 3 February 1993; NMV A13314 (130) Gulf of Carpentaria, 114 km W of Prince of Wales Island, 10° 50' 35.99" S, 141° 12' 42.00" E, 27 m, 3 February 1993; NMV A13315 (2, 114–141) Gulf of Carpentaria, 111 km W of Prince of Wales Island, 10° 49' 48.00" S, 141° 08' 12.00" E, 30 m, 4 February 1993; NMV A13316 (190) Gulf of Carpentaria, 105 km W of Prince of Wales Island, 10° 47' 35.99" S, 141° 11' 30.00" E, 27 m, 3 February 1993; NMV A14169 (95) Gulf of Carpentaria, 70 km W of Weipa, 12° 39' 06.00" S, 141° 12' 54.00" E, 40 m, 22 January 1993; NMV A18718 (150) off Innisfail, 17° 27' 56.99" S, 146° 07' 06.60" E, 25 January 1996; NMV A2921 (2, 120–125) Gulf of Carpentaria, 45 km W of Cullen Point, 11° 55' 11.99" S, 141° 28' 11.99" E, 33 m, 7 September 1982; NMV A3080 (2, 145–210) Gulf of Carpentaria, 55 km NNW of Duyfken, 12° 07' 11.99" S, 141° 26' 59.99" E, 36 m, 16 September 1982; NMV

A3135 (3, 135–160), Gulf of Carpentaria, 60 km W of Weipa, 12° 36' 18.00" S, 141° 19' 55.80" E, 40 m, 25 February 1983; NMV A3157 (3, 115–120) Great Barrier Reef, near Haggerstone Island, 12° 03' 16.92" S, 143° 15' 10.08" E, 26–29 m, 27 February 1983; NMV A3182 (2, 105–145) Gulf of Carpentaria, 155 km W of Cape York, 10° 49' 43.20" S, 141° 08' 32.39" E, 32 m, 26 February 1983; NMV A3188 (4, 84.8–131) Cape York, 60 km E of Cape Melville, 14° 40' 47.99" S, 145° 03' 48.60" E, 12.5 m, 28 February 1983; NTM S.13272-005 (2, 73–93) Gulf of Carpentaria, Booby Island, 10° 42' 00" S, 141° 39' 00" E, 12 m, 29 November 1991; NTM S.13273-017(4, 60–94) Gulf of Carpentaria, Booby Island, 10° 43' 59" S, 141° 52' 59" E, 10 m, 29 November 1991; QMB I.289† (?)Moreton Bay, Myora Banks, 27° 28' S, 153° 25' E; QMB† I.692† (?)Cape York, Cape Grenville, 11° 58' S, 143° 14' E; QMB I.945 (266, syntype of *Choerops perpulcher*?, mount) Moreton Bay, 27° 15' S, 153° 15' E; QMB I.1054† (?) Moreton Bay, Bulwer, 27° 5' S, 153° 22' E; QMB I.1055† (?) Moreton Bay, Bulwer, 27° 5' S, 153° 22' E; QMB I.1056† (?) Moreton Bay, Bulwer, 27° 5' S, 153° 22' E; QMB I.1212† (?) Moreton Bay, 27° 15' S, 153° 15' E; QMB I.1331† (?) Southport, 27° 58' S, 153° 25' E; QMB I.2110† (?) Moreton Bay, 27° 15' S, 153° 15' E; QMB I.2130† (?) Moreton Bay, 27° 15' S, 153° 15' E; QMB I.2146† (?) Moreton Bay, 27° 15' S, 153° 15' E; QMB I.3067† (?) Moreton Bay, 27° 15' S, 153° 15' E; QMB I.3113† (?) Moreton Bay, 27° 15' S, 153° 15' E; QMB I.3347† (?) S coast of Queensland; QMB I.9919* (165) Great Sandy Strait, 25° 20' N, 153° E; QMB I.9920* (229, syntype of *Choerops perpulcher*?) Moreton Bay, 27° 15' N, 153° 15' E; QMB I.11408† (?) Moreton Bay, 27° 15' S, 153° 15' E; QMB I.11409† (?) off Caloundra, 26° 48' S, 153° 15' E; QMB I.11778† (?) Far North Queensland coast; QMB I.12164† (?) off Cairns, 16° 50' S, 146° E; QMB I.13462† (?) Gulf of Carpentaria, 17° 20' S, 139° 32' E, 5.9 m, 8 December 1963; QMB I.14275† (?) Dampier, 20° 39' S, 116° 43' E, 1977; QMB I.15240† (?) Torres Strait, 9° 49' S, 142° 48' E, 12.8–14.6 m, 4 April 1974; QMB I.15625† (?) 2 miles NW of Nymph Island, 14° 36' S, 145° 14' E, 15 m, 8 February 1979; QMB I.15673† (?) 5 miles WNW of Lizard Island, 15° 30' S, 145° 22' E, 20 m, 8 February 1979; QMB I.15969† (?) Princess Charlotte Bay, 14° 20' S, 144° 7' E, 12–15 m, 23 February 1979; QMB I.16163† (?)2 miles NE of Hannibal Island, 11° 33' S, 142° 57' E, 21.9 m, 15 February 1979; QMB I.17532† (?) Torres Strait, 9° 28' S, 142° 53' E, 7 m, 24 March 1974; QMB I.17533† (?) Torres Strait, 9° 35' S, 143° 2' E, 10.1–11.9 m, 26 March 1974; QMB I.17534† (?) Torres Strait, 9° 37' S, 142° 47' E, 8.2–12.8 m, 27 March 1974; QMB I.17535† (?) Torres Strait, 9° 39' S, 142° 47' E, 8.2–10.1 m, 28 March 1974; QMB I.17536† (?) Torres Strait, 9° 40' S, 142° 56' E, 11 m, 29 March 1974; QMB I.17537† (?) Queensland, 9° 47' S, 142° 43' E, 13.7–14.6 m, 2 April 1974; QMB I.17538† (?) Torres Strait, 9° 49' S, 142° 49' E, 14.6–18.3 m, 4 April 1974; QMB I.17539† (?) Torres Strait, 9° 51' S, 142° 49' E, 14.6–18.3 m, 5 April 1974; QMB I.17540† (?) Torres Strait, 9° 53' S, 142° 48' E, 15.5–17.4 m, 6 April 1974; QMB I.17541† (?) Torres Strait, 9° 47' S, 142° 43' E, 13.7–14.6 m, 2 April 1974; QMB I.17542† (?) Torres Strait, 9° 58' S, 142° 43' E, 15.5–17.4 m, 8 April 1974; QMB I.17543† (?) Torres Strait, 10° S, 142° 42' E, 13.7–15.5 m, 8 April 1974; QMB I.17544† (?) Torres Strait, 9° 55' S, 141° 33' E, 12.8–14.6 m, 31 May 1974; QMB I.17545† (?)Torres Strait, Dalrymple Islet, 10° 2' S, 142° 41' E, 14 October 1974; QMB I.17546† (?) Torres Strait, Yorke Island, 9° 44' S, 143° 25' E, 15 October 1974; QMB I.17547† (?) Thursday Island Harbour, 10° 35' S, 142° 13' E, 20 March 1974; QMB I.17548† (?) Torres Strait, Keats Island, 9° 41' S, 143° 27' E, 12 October 1974; QMB I.17549† (?) Torres Strait,Stephen to Bramble Cay, 9° 20' S, 143° 42' E, 32.9–34.7 m, 13 October 1974; QMB I.18099† (?) Princess Charlotte Bay, 14° 5' S, 144° 4' E, 25.6 m, 19 September 1979; QMB I.18141† (?) E of Hannah Island, 13° 52' S, 143° 51' E, 31.1 m, 23 September 1979; QMB I.18211† (?) NE of Lizard Island, 14° 20' S, 145° 51' E, 23.8 m, 18 September 1979; QMB I.18249† (?) NW of Bird Island, 11° 45' S, 143° 3' E, 20.1 m, 27 September 1979; QMB I.18263† (?) ESE of Wilkie Island, 13° 45' S, 143° 47' E, 18.3 m, 28 September 1979; QMB I.18270† (?) Princess Charlotte Bay, 14° 10' S, 144° 9' E, 21.9 m, 29 September 1979; QMB I.21195† (?) Gulf of Carpentaria, 16° 51' S, 139° 52' E, 17 m, January 1983; QMB I.21337† (?) SE of Lady Elliot Island, 24° 7' S, 152° 43' E, 46–55 m, 9 March 1982; QMB I.21448† (?) mouth of Moon Creek, Fraser Island, 25° 14' S, 153° E, 2–4 m, 3 October 1984; QMB I.22724† (?) Grasstree Creek, Sarina Beach, 21° 22' S, 149° 18' E, 14 April 1987; QMB I.23475† (?) off Hinchinbrook Island, 18° 27' S, 146° 25' E, 24 m, 15 April 1985; QMB I.25522† (?) 40 miles NE of Mornington Island, 16° 4' S, 140° 3' E, February 1988; QMB I.26809† (?) Flinders Island, Princess Charlotte Bay, 14° 10' S, 144° 15' E, 1 July 1990; QMB I.27732† (?) Gulf of Carpentaria, 10° 20' S, 141° 9' E, 23 m, 3 December 1990; QMB I.34458† (?) Sweers Island, rocky reef ca 400 m off SW tip, 17° 8' S, 139° 36' E, 0.5–2 m, 16 November 2002; QMB I.34622† (?) Sweers Island, 150 m off beach at centre of E side, 17° 7' S, 139° 37' E, 0.3–0.5 m, 23 November 2002; QMB I.35161† (?) 15 36.9' S, 145 22.5' E–15 36.9' S, 145 22.5' E, 29 September 2003; QMB I.35806† (?) 19.53.7' S, 148.12.9' E–19.53.7' S, 148.12.9' E, 12 m, 6 December 2003; QMB I.9919† (165) Moreton Bay, Great Sandy Strait. ***Northern Territory:*** AMS I.21848-004† (200) Arafura Sea, 11° 17' S, 134° 05' E–11° 18' S, 134° 02' E, 40–44 m, 18 November 1980; CSIRO C 3981 (159) Gulf of Carpentaria, Robinson River, 15° 55' S, 137° 30' E, 31 October 1971; NTM S.10050-001 (2, 100–110) Darwin Harbour, 12° 16' 01" S, 130° 54' 00" E, 4 April 1977; NTM S.10939-005 (114) Groote Eylandt, Bickerton Island, 13° 58' 01" S, 136° 18' 00" E, 17 m, 1 March 1983; NTM S.10941-007 (131) Groote Eylandt, Bickerton Island, 14° 04' 59" S, 136° 04' 59" E, 15 m, 2 March 1983; NTM S.13258-004 (217) Gulf of Carpentaria, Cape Grey, 13° 07' 59" S, 136° 35' 60" E, 19 m, 23 November 1991; NTM S.12941-008 (3, 175–195) Arafura Sea, 11° 28' 59" S, 133° 35' 60" E, 23 m, 22 October 1990; NTM S.12958-011 (159) Arafura Sea, 11° 36' 00" S, 135° 31' 01" E, 33 m, 26 October 1990; NTM S.12960-002 (160) Marchinbar Island, Arafura Sea, 11° 13' 59" S, 135° 58' 01" E, 38 m, 26 October 1990; NTM S.13333-012 (226) Arafura Sea, 11° 19' 01" S, 134° 28' 01" E, 39 m, 23 October 1990; NTM S.12445-069 (165) Cobourg Peninsula, Orontes Reef, 11° 05' 60" S, 132° 04' 01" E, 20 m, 10 August 1986; USNM 174393 (227); WAM P.14391-001† (1) Darwin area, 12° 15' S, 130° 25' E, September 1965. ***Western Australia:*** AMS I.22802-010* (3, 184–233) North West Shelf, Port Hedland, 19° 39' S, 117° 53' E, 52–53 m, 26 March 1982; CSIRO C 508 (141) Shark Bay, Carnarvon, Cape Ronsard, 12.6–14.4 m, 7 September 1948; CSIRO C 541 (132) Shark Bay, Cape Levillian, Dirk Hartog Island, 13 September 1948; CSIRO C 2315 (106) Shark Bay, Cape Peron, 25° 30' S, 113° 30' E, 10.8 m, 27 August 1953; CSIRO C 2339 (131) Exmouth Gulf, 22° S, 114° E, 1954; CSIRO C 2497 (128) Exmouth Gulf, 22° S, 114° E, 1954; CSIRO C 2524 (109) Shark Bay, Denham Sound, 25° 43' S, 113° 15' E, August 1955; CSIRO C 2678 (133) Dampier Archipelago,

Lancelin; CSIRO C 3869 (124) Exmouth Gulf, Giralia Bay, 6 September 1966; CSIRO C 3870 (113) Exmouth Gulf, Giralia Bay, 6 September 1966; CSIRO CA 255 (202) Monte Bello Islands, 11 May 1978; CSIRO CA 1728 (149) Barrow Island, 20° 47.0' S, 115° 59.0' E–20° 49.0' S, 115° 59.0' E, 20 m, 6 December 1979; CSIRO CA 2144 (200) Forestier Island, 19° 52.0' S, 118° 12.0' E–19° 53.0' S, 118° 14.0' E, 38 m, 3 June 1980; CSIRO CA 2154 (253) Monte Bello Islands, 20° 15.0' S, 115° 56.0' E–20° 17.0' S, 115° 55.0' E, 48–50 m, 27 May 1980; CSIRO CA 2159 (158) Admiralty Gulf, 14° 01' S, 125° 34' E–14° 03' S, 125° 33' E, 44 m, 25 June 1980; CSIRO H 2782-03 (128) North West Shelf, Port Hedland, 19° 29.7' S, 118° 52.2' E–19° 29.2' S, 118° 52.7' E, 39 m, 24 October 1983; CSIRO H 4028-01† (266) Dampier Archipelago, 20° 18.3' S, 116° 29.8' E–20° 18.6' S, 116° 28.4' E, 40 m, 28 August 1995; NTM S.11924-014 (136) Dampier Archipelago, 20° 04' 01" S, 116° 37' 01" E, 80 m, 10 June 1986; NTM S.14362-015 (175) Holothuria Banks, West Holothuria Reef, 13° 25' 12" S, 125° 39' 18" E, 50 m, 12 June 1996; NTM S.17058-003 (150) North West Shelf, Bedout Island, 19° 22' 59" S, 118° 28' 01" E, 70 m, 25 January 1984; QMB I.10234† (?) Shark Bay, 30 miles S of Carnarvon, 25° 16' S, 113° 40' E, 3 June 1972; QMB I.23201† (?) Exmouth Gulf, 22° S, 114° 20' E, 9–11 m, 2 May 1972; WAM P.25397-018† (8, 116–140) Rowley Shoals, 17° 29' S, 121° 52' E, 0–42 m, 21 December 1969; WAM P.26197-010† (175) 20° 05' 00" S, 117° 05' 00" E, 0–44 m, 17 May 1978; WAM P.25354-022† (3, 137–162) Monte Bello Islands, 20° 25' S, 115° 30' E, April 1975; WAM P.25354-053† (250) Monte Bello Islands, 20° 25' S, 115° 30' E, April 1975; WAM P.25508-041† (129) Exmouth Gulf, 21° 57' S, 114° 12' E, 20–30 m, 6 December 1975; WAM P.2489-001† (1) Exmouth Gulf, 22° 05' S, 114° 15' E, October 1943; WAM P.23798-001† (1) Exmouth Gulf, Sunday Island, 22° 05' S, 114° 15' E, 12.8–18.2 m, September 1973; WAM P.25095-018† (8, 87–176) Exmouth Gulf, 22° 05' S, 114° 15' E, 0–12 m, October 1974; WAM P.25095-033† (5, 98–119) Exmouth Gulf, 22° 05' S, 114° 15' E, 0–12 m, October 1974; WAM P.30239-006† (2, 86–190) Exmouth Gulf, 22° 15' 00" S, 114° 20' 00" E, 24 March 1991; WAM P.23455-001† (1) Learmonth, 22° 15' S, 114° 05' E, June 1973; WAM P.23683-001† (1) Carnarvon, 24° 53' S, 113° 40' E, 29.8 m, 19 July 1972; WAM P.13953-001† (1) Shark Bay, 25° 21' S, 113° 44' E, August 1965; WAM P.32279-002† (97) Shark Bay, Cape Peron North, 25° 23.122' S, 113° 25.822' E, 16.8–16.9 m, 3 October 2002; WAM P.31978-024† (85) Shark Bay, 25° 25' S, 113° 35' E, November 1998; WAM P.32267-004† (80) Shark Bay, Cape Peron North, 25° 30.544' S, 113° 33.699' E, 13.2–13 m, 1 October 2002.

Choerodon cyanodus. (150 specimens examined, 19.8–300 mm SL). **Australia**: BMNH 1876.5.11.32 (230) "Tahiti", Godeffroy. ***New South Wales:*** AMS I.45736-001† (1) Port Jackson, 33° 52' S, 151° 50' E, 33° 48' S, 151° 54' E. ***Queensland***: AMS I.391 (202) Cardwell, 18° 16' S, 146° 01' E, 1886; AMS I.3433 (275) Thursday Island, 10° 35' S, 142° 13' E, 1895; AMS I.3434 (110) same collection data as AMS I.3433; AMS I.6076 (211) Northern Territory, Port Darwin, 12° 27' S, 130° 48' E, 1903; AMS I.9487 (122) Wide Bay, 25° 52' S, 153° 07' E, 1908; AMS I.11024† (1) Fraser Island, Boomerang Hill (5 miles NW), 25° 20' S, 153° 17' E, 27, 29 June 1910; AMS I.11929 (189) Cape York, 10° 00' S, 142° 00' E, 1907; AMS I.11930 (193) same collection data as AMS I.11929; AMS I.11931* (176) same collection data as AMS I.11929; AMS I.11932 (165) same collection data as AMS I.11929; AMS I.11933 (165) same collection data as AMS I.11929; AMS I.11934 (175) same collection data as AMS I.11929; AMS I.11935 (169) same collection data as AMS I.11929; AMS I.11936* (178) same collection data as AMS I.11929; AMS I.11937* (166) same collection data as AMS I.11929; AMS I.12542 (135) Great Sandy Strait, 23° 35' S, 152° 58' E, 1912; AMS I.12632 (220) Masthead Island, 23° 32' S, 151° 44' E, August 1912; AMS I.15557-207* (134) Gulf of Carpentaria, 17° 25' S, 140° 10' E, 10.1, 27 November 1963; AMS I.15680-018 (250) One Tree Island, 23° 30' S, 152° 05' E, 1 m, 24 November 1969; AMS I.18219-001† (337) One Tree Island, 23° 30' S, 152° 05' E, 4 December 1974; AMS I.19356-033 (2, 34–116) Prince of Wales Island, 10° 41' S, 142° 07' E, 1 m, 2 July 1976; AMS I.20464-019 (195) One Tree Island, 23° 30' S, 152° 05' E, 1 m, 8 October 1972; AMS I.20773-025† (103) Nymph Island, 14° 39' S, 145° 15' E, 1–2 m, 6 December 1978; AMS I.20776-028 (2, 50–58) Cape York, False Orfordness, 11° 23' S, 142° 52' E, 3–4 m, 18 February 1979; AMS I.22072-029 (90) Port Douglas, 16° 29' 58" S, 145° 28' 00" E, 1 m, 24 September 1980; AMS I.26248-014 (152) Gulf of Carpentaria, between Sweers and Little Bountiful islands, 16° 45' S, 139° 50' E, 15 m, January 1971; AMS I.33759-006† (183) Bet Reef, 10° 10' 32" S, 142° 56' 01" E, 18–21 m, 30 January 1993; AMS I.34301-048 (37) Shoalwater Bay, Sabina Point, 22° 23' 45" S, 150° 18' 14" E, 0.3 m, 14 September 1993; AMS I.34301-052 (3, 80–95) Shoalwater Bay, Sabina Point, 22° 23' 45" S, 150° 18' 14" E, 0.3 m, 14 September 1993; AMS I.34302-002† (240) Shoalwater Bay, Sabina Point, 22° 23' 49" S, 150° 18' 15" E, 2 m, 14 September 1993; AMS I.34311-020 (14, 43–136) Shoalwater Bay, Collins Island, 22° 14' 47" S, 150° 19' 08" E, 3 m, 15 September 1993; AMS I.34311-029† (11, 50–138) Shoalwater Bay, Collins Island, 22° 14' 47" S, 150° 19' 08" E, 3 m, 15 September 1993; AMS I.34318-023 (3, 62–106), AMS I.34318-024 (36.7) Townshend Island, 22° 12' 14" S, 150° 28' 32" E, 0.2 m, 16 September 1993; AMS IA.2591 (1) Capricorn Group, North West Island, 23° 30' S, 152° 00' E, 1926; AMS IA.2725 (220) Harvey Bay, 25° S, 152° E, 1926; AMS IA.6381 (150) Hayman Island, 20° 03' S, 148° 53' E, 1935; AMS IA. 6723 (1) Lindeman Island, Kenney Sound and Shaw Island, 20° 27' S, 149° 03' E, 1936; AMS IB.2170 (1, head) islands off Emu Park, 23° 15' S, 150° 53' E, 1948; AMS IB.2171 (1, head) same collection data as AMS IB.2170; AMS IB.3870 (1) Heron Island, 23° 26' S, 151° 55' E, 1957; AMS IB.8343† (260) Townsville, Bay Rock, 19° 07' S, 146° 45' E, 1966; BMNH 1847.6.17.57 (179, type of *Labrus arilca*?, skin) Endeavour Straits, Bramble Island, 13 February 1845; BMNH 1850.7.20.65* (195, skin) Cape York, 31 October 1849, HMS Rattlesnake; BMNH 1911.4.1.30-31 (2, 166–168) Northern Queensland, Saville Kent; CSIRO C 4239 (220) Gulf of Carpentaria, Lakes Islet, 29 October 1971; CSIRO C 4479 (157) Gulf of Carpentaria, Bentnick Island, 16° 55' S, 139° 37' E, 12.5 m, 1 November 1972; CSIRO H 7673-03 (127) Torres Strait, E of Banks Island, 10° 06.74' S, 142° 39.63' E, 12 January 2004; QMB I.95* (121) Cardwell, 18° 16' S, 146° 1' E; QMB I.110* (226, type of *Choerops albigena*) Cape York, 10° 41' S, 142° 32' E; QMB I.852† (?) Capricorn Group, Masthead Island, 23° 32' S, 151° 44' E; QMB I.853† (?) same collection data as QMB I.852; QMB I.946 (117, type of *Choerops concolor*, mount) North-East Queensland; QMB I.1332† (?) Great Sandy Strait, 25° 20' S, 153° E; QMB I.1870† (?) Magnetic Island, 19° 8' S, 146° 50' E; QMB I.4734† (?) Dunk Island, 17° 57' S, 146° 9' E; QMB I.4737† (?); QMB I.5471† (?) Heron

Island, 23° 27' S, 151° 55' E; QMB I.5524† (?) Heron Island, 23° 27' S, 151° 55' E; QMB I.5600† (?) Salamander Rocks, off Cape Cleveland, 19° 11' S, 147° 4' E; QMB I.5840* (134) Great Palm Island, Butler Bay, 18° 46' S, 146° 36' E; QMB I.5841 (1) Great Palm Island, Butler Bay, 18° 46' S, 146° 36' E; QMB I.5876† (?) Whitsunday Group, Shaw Island, 20° 29' S, 149° 5' E; QMB I.6109* (1) Townsville; QMB I.6145† (?) Four Foot Rocks, off Cape Cleveland, 19° 11' S, 147° 3' E; QMB I.6146† (?) same collection data as QMB I.6145; QMB I.6147† (?) same collection data as QMB I.6145; QMB I.6972† (?) Magnetic Island, 19° 8' S, 146° 50' E; QMB I.9902† (?) Lindeman Island, 20° 27' S, 149° 2' E, 1936; QMB I.11537† (?) Mackay, 21° 9' S, 149° 12' E; QMB I.13459† (?) Bushy Island, 80 km ENE of Mackay, 20° 58' S, 150° 5' E; QMB I.17550† (?) Torres Strait, Warrior Islet, 9° 46' S, 142° 57' E, 1 April 1974; QMB I.17551† (?)Torres Strait, Yam Island, 9° 53' S, 142° 45' E, 6 April 1974; QMB I.17669† (?) Torres St, Aeroplane Sandbank, 10° 23' S, 143° 19' E, 8 m, 20 July 1974; QMB I.17550† (?) Torres Strait, Warrior Islet, 9° 46' S, 142° 57' E, 1 April 1974; QMB I.17551† (?) Torres Strait, Yam Island, 9° 53' S, 142° 45' E, 6 April 1974; QMB I.17669† (?) Torres Strait, Aeroplane Sandbank, 10° 23' S, 143° 19' E, 8 m, 20 July 1974; QMB I.21128† (?) Weipa Channel, 12° 37' S, 141° 52' E, 17 May 1984; QMB I.21129† (?) Weipa Channel, 12° 37' S, 141° 52' E, 17 May 1984; QMB I.21891† (?)Sarina, Campwin Beach Headland, 21° 23' S, 149° 19' E, 0.5–1 m, 1 December 1985; QMB I.22718† (?) Sarina Beach, Victor Island, 21° 19' S, 149° 19' E, 8 April 1987; QMB I.22757† (?)Sarina Beach, Victor Island, 21° 19' S, 149° 19' E, 8 April 1987; QMB I.22795† (?) Sarina Inlet, 21° 24' S, 149° 19' E, 0.5 m, 10 April 1987; QMB I.26070† (?) Proserpine, Bait Reef, 19° 48' S, 149° 4" E, 29 March 1975; QMB I.26836† (?)Torres Strait, Warrior Reefs, 9° 48' S, 142° 58' E, 27 March 1990; QMB I.28360† (?) Sabina Point, 22° 24' S, 150° 18' E, 0.5 m, 14 September 1993; QMB I.33697† (?) Bountiful Island, 16° 39' S, 139° 53' E, 0–3.5 m, 22 November 2002; QMB I.33732† (?) Bountiful Island, 16° 38' S, 139° 53' E, 2–4 m, 22 November 2002; QMB I.33773† (?) Sweers Island, 17° 9' S, 139° 36' E, 2–3.5 m, 15 November 2002; QMB I.34432† (?) Sweers Island, 17° 8' S, 139° 36' E, 0.5–2 m, 16 November 2002; QMB I.34503† (?) Sweers Island, 17° 8' S, 139° 37' E, 1.5–2.5 m, 17 November 2002; QMB I.34546† (?) Sweers Island, 17° 5' S, 139° 39' E, 0.5–3 m, 18 November 2002; QMB I.34588† (?) Sweers Island, 17° 8' S, 139° 37' E, 0.1–1.5 m, 21 November 2002; QMB I.34627† (?) Sweers Island, 17° 7' S, 139° 37' E, 0.3–0.5 m, 23 November 2002; QMB I.34648† (?) Sweers Island, 17° 10' S, 139° 38' E, 0.1–2 m, 24 November 2002; QMB I.34696† (?) Sweers Island, 17° 8' S, 139° 37' E, 0.1–1 m, 19 November 2002; QMB I.34714† (?) Sweers Island, 17° 8' S, 139° 37' E, 0.1–1 m, 19 November 2002; ***Northern Territory***: AMS I.23948-018 (3, 39–48) East Arm, 12° 29' S, 130° 55' E, 11 August 1983; AMS I.24676* (13, 19.8–61.7) Darwin, 12° 28' S, 130° 54' E, 1 m, 29 August 1984; AMS I.24678-056 (11, 90–218) Darwin, 12° 25' S, 130° 49' E, 1 m, 31 August 1984; AMS I.25637-001 (158) Darwin, 12° S, 130° 48' E, 1977; AMS IA.1463* (157) Gulf of Carpentaria, Pellew Group, 15° 33' S, 136° 59' E, June 1923; AMS IA.1670† (1) Gulf of Carpentaria, Pellew Group, 15° S, 136° E, 1923; AMS IA.1671 (187) Gulf of Carpentaria, Pellew Group, 15° S, 136° E, 1923; AMS IA.2541 (129) Pellew Group, Vanderlin Island, 15° 42' S, 136° 59' E, 1926; AMS IA.3854 (116) Darwin, 12° 27' S, 130° 48' E, 1929; AMS IA.7769 (164) Darwin, Point Charles, 12° 23' S, 130° 37' E, 1938; AMS IA.7828 (178) Melville Island, 11° 37' S, 131° 26' E, 1938; BMNH 1843.6.15.46* (207, holotype of Labrus cyanodus, skin) Black Point, Port Essington; BMNH 1847.6.17.56* (254, skin) Port Essington, Earl of Derby; BMNH 1858.12.27.36* (190, skin) "Victoria" (Northern Territory?), HMS Herald; CSIRO CA 704 (243) Groote Eylandt, Dalumbu Bay, 14° 11' S, 136° 44' E, 19 March 1979; CSIRO CA 1227 (187) Alyangula, 13° 50' S, 136° 24' E, 15 March 1980; CSIRO CA 1228 (186) Alyinga Island, 13° 4' S, 136° 3' E, 1 September 1980; NMV A7991 (228) The English Company Islands, 11° 51' S, 136° 23' E, 10–20 m, 1989; NTM S.10454-010† (6, 124–192) Port Essington, Orontes Reef, 11° 04' 01" S, 132° 04' 59" E, 5 May 1982; NTM S.10415-013† (2, 30–51) Lee Point Reef, 12° 19' 59" S, 130° 54' 00" E, 13 December 1981; NTM S.16133-002† (180) Bynoe Harbour, Indian Island, 12° 39' 11" S, 130° 31' 34" E, 12 m, 7 April 2002; NTM S.10472-001† (178) Darwin Harbour, Channel Island, 12° 33' 00" S, 130° 52' 01" E, 15 July 1982; NTM S.10040-001† (194) Darwin Harbour, South Shell Island, 12° 30' 00" S, 130° 54' 00" E, 8 January 1982; NTM S.10015-011† (2, 134–144) Cobourg Peninsula, Coral Bay, 11° 10' 59" S, 132° 04' 01" E, 17 October 1981; NTM S.10431-008† (5, 25–165) Cobourg Peninsula, Danger Point, 11° 07' 01" S, 132° 19' 59" E, 1 May 1982; NTM S.10436-005† (177) Cobourg Peninsula, Danger Point, 11° 07' 01" S, 132° 19' 59" E, 29 April 1982; NTM S.10603-034† (3, 35–64) North Oxley Island, 11° 00' 00" S, 132° 49' 01" E, 19 October 1982; NTM S.10004-005† (5, 114–165) Cobourg Peninsula, Sandy Island, 11° 07' 01" S, 132° 16' 59" E, 21 October 1981; NTM S.10005-013† (17, 36–100) Cobourg Peninsula, Burford Island, 11° 28' 59" S, 131° 56' 60" E, 13 October 1981; NTM S.10006-010† (84) Cobourg Peninsula, Burford Island, 11° 28' 59" S, 131° 56' 60" E, 13 October 1981; NTM S.10397-002† (2, 166–185) Darwin, 1977; NTM S.10432-012† (105) Port Essington, Table Head, 11° 13' 01" S, 132° 10' 01" E, 3 May 1982; NTM S.10033-013† (3, 12–58) Darwin Harbour, Dudley Point, 12° 25' 01" S, 130° 49' 01" E, 13 November 1981; NTM S.11295-016† (210) East Bremer Islet, 11 March 1976; NTM S.12449-005† (167) , Darwin Harbour, South Shell12° 30' 00" S, 130° 52' 59" E, 18 February 1982; NTM S.16122-031† (188) Port Patterson, Turtle Island, 12° 37' 48" S, 130° 27' 29" E, 8 April 2002; NTM S.11199-002† (285) Cape Arnhem, Gove, "White Island", 27 March 1975; NTM S.11304-001† (207) Gove, 15 March 1976; NTM S.13130-001† (235) Groote Eylandt, NW Bluff, 13° 49' 59" S, 136° 24' 00" E, 9 February 1989; NTM S.11578-001† (2, 105–215) Melville Bay, South Granite Island, 12° 13' 59" S, 136° 40' 01" E, 25 May 1975; NTM S.11306-002† (214) Melville Bay, Gove, 29 October 1975; NTM S.16115-013† (177) Port Patterson, Moira Reef, 12° 30' 54" S, 130° 30' 40" E, 13 m, 3 May 2002; NTM S.16116-003† (167) Port Patterson, Simms Reef, 12° 34' 12" S, 130° 26' 60" E, 20 m, 4 May 2002; NTM S.12811-002† (50) Darwin Harbour, Channel Island, 12° 31' 01" S, 130° 50' 60" E, 14 November 1985; NTM S.13237-013† (5, 145–195) Rimbija Island, Cape Wessel, 11° 01' 01" S, 136° 40' 59" E, 1 m, 16 November 1990; NTM S.13228-005† (2, 107–152) English Company Islands, Wigram Island, 11° 43' 59" S, 136° 37' 59" E, 12 November 1990; NTM S.13226-003† (2, 122–158) English Company Islands, Wigram Island, 11° 46' 59" S, 136° 35' 17" E, 12 November 1990; NTM S.14469-022† (5, 125–211) Field Island, 12° 03' 32" S, 132° 23' 17" E, 14 June 1997; NTM S.14471-018† (3, 81–113) Field Island, 12° 05' 17" S, 132° 19' 08" E, 5 June 1997; NTM S.14665-004† (200) Field Island, 12° 04' 12" S, 132° 19' 19" E, 5 June 1998; NTM S.14949-004†

(145) Adam Bay, Cape Hotham, 12° 05' 10" S, 131° 15' 11" E, 9 m, 12 June 1996; NTM S.11263-018† (5, 105–188) Cobourg Peninsula, Coral Bay, 11° 12' 00" S, 132° 03' 00" E, 18 May 1983; NTM S.16160-005† (46, 32–170) Port Patterson, Quail Island, 12° 31' 23" S, 130° 25' 37" E, 7 December 2002; NTM S.15221-021† (7, 36–50) Darwin Harbour, Nightcliff, 12° 22' 59" S, 130° 50' 17" E, 1 m, 12 October 2000; NTM S.14965-018† (2, 105–117) Field Island, 12° 05' 13" S, 132° 18' 36" E, 1 m, 10 October 1999; NTM S.14966-007† (165) Field Island, 12° 03' 32" S, 132° 23' 20" E, 1 m, 10 October 1999; NTM S.16155-005† (56) Port Patterson, Middle Reef, 12° 28' 12" S, 130° 30' 18" E, 5 December 2002; NTM S.15916-020† (4, 11–43) Kakadu National Park, Field Island, 12° 03' 25" S, 132° 24' 32" E, 1 m, 19 August 2004; NTM S.16112-001† (2, 209–253) Groote Eylandt, Awangmarra, 13° 42' 00" S, 136° 39' 00" E, 16 August 1979; NTM S.16037-001† (193) Darwin Harbour, Blackmore Point, 12° 34' 16" S, 130° 50' 53" E, 4 m, 27 January 2005; NTM S.11260-034† (3, 100–184) Cobourg Peninsula, Coral Bay, 11° 10' 59" S, 132° 03' 00" E, 16 May 1983; NTM S.10443-003† (2, 195–237) Cobourg Peninsula, Danger Point, 11° 07' 01" S, 132° 19' 59" E, 30 April 1982; NTM S.11488-006† (3, 64–80) Darwin Harbour, Vesteys Beach, 12° 27' 00" S, 130° 49' 59" E, 15 November 1982; NTM S.10979-004† (7, 53–66) Darwin Harbour, Dudley Point, 12° 12' 14" S, 130° 49' 01" E, 15 November 1982; NTM S.17312-001† (200) Port Bremer, Sandy Island, 11° 07' 01" S, 132° 17' 31" E, 20 October 1981; NTM S.16708-064† (42, 41–182) Darwin Harbour, Vesteys Beach, 12° 26' 10" S, 130° 49' 44" E, 0.3 m, 14 November 2008; NTM S.17390-002† (180) Darwin Harbour, Stevens Rock, 12° 29' 10" S, 130° 47' 06" E, 5 m, 15 August 2012; USNM 174367* (96.6); USNM 174385 (22, 23.2-117) Groote Eylandt, Little Lagoon, 25 April 1948; USNM 174395* (200) Yirrkala; USNM 174405* (174) ; USNM 174383 (1) Groote Eylandt, 0–1 m, 19–25 April 1948; USNM 134388* (109) East Point reef, NNW of Darwin, 0–0.5 m, 26 March 1948; USNM 174397* (2, 156–194) Arnham Land, Yirrkala, NW of Cape Arnhem, 5–6 m, 6 August 1948; USNM 174401* (247) Yirrkala, NW of Cape Arnhem, 14–16 August 1948; USNM 174406* (237), Arnhem Land, Port Bradshaw, W from Cape Arnhem, 0–4 m, 22–26 July 1948; USNM 174409* (232) Bickerton Island, South Bay, 0 m, 2 June 1948. ***Western Australia***: AMS I.12950 (300), Port Hedland, 20° 18' S, 118° 35' E, 1914; AMS I.12951 (222) Port Hedland, 20° 18' S, 118° 35' E, 1914; AMS I.17060-013 (2, 215–255) Exmouth Gulf, Bundegi Reef, 21° 52' S, 114° 09' E, 1 m, 19 January 1972; AMS IB.1590 (159) Onslow, 21° 38' S, 115° 07' E, 1946; MNHN A.8890* (207, type of *Chaerops crassus*) Dampier Archipelago, Castelnau; NTM S.12587-024† (2, 46–74) Cape Leveque, 16° 25' 01" S, 122° 25' 01" E, 1 m, 18 March 1987; WAM P.25310-002 (2, 52–68) Houtman Abrolhos, Beacon Island, 28° 30' S, 113° 44' E, 2–15 m, 18 May 1975;WAM P.25749-001 (218) Rottnest Island, 31° 59' S, 115° 33' E, 8–10 m, 3 March 1977; WAM P.25759-001 (117) Rottnest Island, 31° 59' S, 115° 29' E, 2–4 m, 10 March 1977;WAM P.31017-018† (4, 31–72) Exmouth Gulf, Tent Island, 0.1–0.3 m, 18 August 1995; WAM P.31516-011† (2, 28–67) Dampier Archipelago, Searipple Passage, 28 October 1998; WAM P.31092-030† (2, 44–110) Cape Talbot, 13° 45' S, 126° 45' E, 0.1–0.5 m, 27 November 1995; WAM P.31097-046† (3, 106–121) Cape Londonderry, 13° 45' S, 126° 58' E, 0.5–1.5 m, 29 November 1995; WAM P.30307-023† (2, 72–102) Long Reef, 13° 48' 00" S, 125° 47' 00" E, 0.1–1 m, 17 August 1991; WAM P.33432-014† (4, 58–143) Kimberley, Long Reef, 13° 48' 35" S, 125° 49' 26" E, 0–1 m, 23 October 2010; WAM P.33429-010† (2, 103–118) Kimberley, Long Reef, 13° 49' 48" S, 125° 49' 57" E, 0–1, 21 October 2010; WAM P.31244-022† (2, 112–114) Cassini Island, 13° 57' S, 125° 39' E, 0.5 m, 29 November 1996; WAM P.31085-022† (4, 56–121) Long Island, Vansittart Bay, 13° 59' S, 126° 20' E, 0.1–0.3 m, 24 November 1995; WAM P.31249-011† (115) Colbert Island, 14° 53' S, 124° 43' E, 1–2 m, 01 December 1996; WAM P.31250-028† (5, 33–102) Wildcat Reefs, 15° 17' S, 124° 10' E, 0.5 m, 2 December 1996; WAM P.33615-009† (6, 30–141) Kimberley, Beagle Reef, 15° 19' 36" S, 123° 32' 9" E, 0.6 m, 19 October 2011; WAM P.33605-018† (2, 28–29) Kimberley, Champagny Island, 15° 19' 57" S, 124° 14' 09" E, 1.0 m, 15 October 2011; WAM P.30316-003† (6, 27–124) Beagle Reef, 15° 21' 00" S, 123° 32' 00" E, 0.1–1 m, 24 August 1991; WAM P.33274-033† (5, 55–65) Kimberley, Adele Island, 15° 29.474' S, 123° 09.798' E, 0–1 m, 15 October 2009; WAM P.33273-011† (9, 57–92) Kimberley, Adele Island, 15° 31.700' S, 123° 11.611' E, 0–1 m, 14 October 2009; WAM P.33281-024† (4, 63–97) Kimberley, Montgomery Reef, 15° 51.323' S, 124° 18.875' E, 0–1 m, 20 October 2009; WAM P.33283-015† (4, 56–82) Kimberley, Montgomery Reef, 15° 52.727' S, 124° 19.602' E, 0–1 m, 20 October 2009; WAM P.33291-050† (2, 79–103) Kimberley, Montgomery Reef, 15° 53.700' S, 124° 20.340' E, 0–0.5 m, 24 October 2009; WAM P.33278-030† (2, 83–83) Kimberley, Montgomery Reef, 15° 53.815' S, 124° 19.531' E, 0–1 m, 19 October 2009; WAM P.33279-026† (8, 36–109) Kimberley, Montgomery Reef, 15° 53.815' S, 124° 19.531' E, 0–1, 19 October 2009; WAM P.33284-030† (84) Kimberley, Montgomery Reef, 15° 53.895' S, 124° 10.901' E, 0–1 m, 21 October 2009; WAM P.31251-034† (3, 68–94) Montgomery Reef, 15° 55' S, 124° 04' E, 0.7 m, 3 December 1996; WAM P.33286-013† (4, 48–74 m) Kimberley, Montgomery Island, 15° 56.659' S, 124° 16.004' E, 0–1 m, 22 October 2009; WAM P.33285-015† (4, 48–72) Kimberley, Montgomery Reef, 15° 57.528' S, 124° 16.144' E, 0–0.5 m, 22 October 2009; WAM P.33287-025† (3, 70–98) Kimberley, Montgomery Reef, 15° 58.089' S, 124° 16.918' E, 0–1 m, 22 October 2009; WAM P.30851-008† (13, 20–93) Montgomery Reef, 15° 59' 00" S, 124° 17' 00" E, 0.1–0.5 m, 28 September 1994; WAM P.33288-001† (3, 102–113) Kimberley, Montgomery Reef, 16° 00.865' S, 124° 10.389' E, 0–1 m, 20 October 2009; WAM P.30916-020† (77) Admiral Island, 16° 04' 00" S, 123° 24' 00" E, 0.1 m, 20 November 1994; WAM P.30320-042† (5, 102–118) Buccaneer Archipelago, Powerful Island, 16° 05' 00" S, 123° 27' 00" E, 0.1–1 m, 26 August 1991; WAM P.31204-003† (11, 47–112) Kingfisher Island, 16° 07' S, 124° 05' E, 0.1–0.5 m, 27 September 1996; WAM P.30929-019† (103) Whirlpool Pass, 16° 16' 00" S, 123° 30' 00" E, 0.1–0.8 m, 25 November 1994; WAM P.30911-012† (2, 63–66) Gregory Island, 16° 19' 00" S, 123° 19' 00" E, 0.1–0.5 m, 19 November 1994; WAM P.31205-033† (44) Swan Bay, 16° 22' S, 123° 02' E, 0.1–0.5 m, 27 September 1996; WAM P.30902-010† (5, 59–160) Tallon Island, 16° 24' 00" S, 123° 07' 00" E, 0.5 m, 17 November 1994; WAM P.30898-021† (4, 63–116) Sunday Island, 16° 25' 00" S, 123° 11' 00" E, 0.1–1 m, 15 November 1994; WAM P.30321-005† (3, 39–86, Sunday Island, 16° 26' 00" S, 123° 11' 00" E, 0.1–1.5 m, 27 August 1991; WAM P.30908-011† (43) Mermaid Island, 16° 26' 00" S, 123° 21' 00" E, 0.1–1 m, 18 November 1994; WAM P.31391-011† (211) Beagle Bay, 16° 59' S, 122° 40' E, 9–10 m, 28 August 1997; WAM P.28417-003† (6, 23–122) Coulomb Point, 17° 21' S, 122° 09' E, 2 m, 1

September 1981; WAM P.32171-017† (2, 107–172) James Price Point, 17° 26' S, 122° 10' E, 2–7 m, 31 July 1982; WAM P.32169-016† (4, 28–46) Quondong Point, 17° 34' S, 122° 09' E, 1–3 m, 25 August 1982; WAM P.30263-025† (215) Broome, 17° 58' 00" S, 122° 14' 00" E, 28 July 1982; WAM P.27274-02† (3, 61–96) Broome, 17° 58' S, 122° 14' E, 1–2 m, 18 January 1981; WAM P.27457-001† (224) Port Hedland, 20° 18' S, 118° 35' E, 1981; WAM P.31514-034† (1) Dampier Archipelago, Keast Island, 20° 24' S, 116° 50' E, 0.1–0.5 m, 26 October 1998; WAM P.25354-002† (2, 254–280) Monte Bello Islands, 20° 25' S, 115° 30' E, April 1975; WAM P.31512-017† (9, 39–79) Dampier Archipelago, Collier Rocks, 20° 25' S, 116° 51' E, 0.1–0.4 m, 24 October 1998; WAM P.30298-014† (147) Monte Bello Islands, 20° 26' 00" S, 115° 37' 00" E, 12 December 1979; WAM P.31510-008† (2, 21–145) Dampier Archipelago, 20° 26' S, 116° 49' E, 0.1–0.5 m, 22 October 1998; WAM P.30672-017† (2, 36–45) Monte Bello Islands, 20° 28' 33" S, 115° 32' 13" E, 0.1–1.5 m, 25 August 1993; WAM P.25112-001† (3, 155–225) Dampier Archipelago, Kendrew Island, 20° 28' S, 116° 32' E, 0.1–0.5 m, 4 November 1974; WAM P.22230-001† (1) Dampier Archipelago, Kendrew Island, 20° 29' S, 116° 32' E, 26 October 1972; WAM P.22416-001† (1) Dampier Archipelago, Kendrew Island, 20° 29' S, 116° 32' E, 23 October 1972; WAM P.22848-001† (1) Dampier Archipelago, Kendrew Island, Museum Bay, 20° 29' S, 116° 32' E, 20 February 1973; WAM P.25107-015† (185) Dampier Archipelago, Kendrew Island, 20° 29' S, 116° 32' E, 3–5 m, 21 October 1974; WAM P.25114-012† (55) Dampier Archipelago, Rosemary Island, 20° 29' S, 116° 35' E, 1–5 m, 8 November 1974; WAM P.31655-014† (1) Dampier Archipelago, Malus Island, 20° 30.90' S, 116° 40.22' E, 0.1–0.2 m, 27 August 1999; WAM P.4524-001† (1) Dampier Archipelago, 20° 33' S, 116° 32' E, December 1957; WAM P.31659-022† (2, 40–43) Dampier Archipelago, Enderby Island, 20° 35.20' S, 116° 30.91' E, 1 September 1999; WAM P.31661-016† (2, 28–33) Dampier Archipelago, Enderby Island, 20° 36.22' S, 116° 33.06' E, 0.1 m, 2 September 1999; WAM P.2850-001† (175) Onslow, 21° 38' S, 115° 07' E, January 1945; WAM P.31013-027† (9, 30–62) Exmouth Gulf, Burnside Island, 22° 06' 00" S, 114° 31' 00" E, 0.1–0.5 m, 16 August 1995; WAM P.31015-032† (36) Exmouth Gulf, Simpson Island, 22° 07' 00" S, 114° 29' 00" E, 0.1–0.3 m, 17 August 1995; WAM P.12850-001† (1) Shark Bay, 25° 21' S, 113° 44' E, September 1960; WAM P.12851-001† (1) Shark Bay, 25° 21' S, 113° 44' E, September 1960; WAM P.33864-001† (2, 206–265) Shark Bay, Peron Peninsula, 25° 32' S, 113° 30' E, 25 September 2002. **Papua New Guinea**: WAM P.28154-024† (24, 50–108) Daru Island, Daru, 9° 05' S, 143° 15' E, 0.1–0.4 m, 19 September 1983.

Choerodon fasciatus. (49 specimens examined, 31–188 mm SL). **Japan, *Okinawa***: URM-P 22567* (125) May–September 1989; URM-P 40874* (146) Awase fish market, 7 September 2000; URM-P 44551* (170) Henza fish market, 31 May 2008; USNM 62234 (1) Naha. **Philippines**: USNM 202508 (1) Luzon. **Australia, *Queensland***: AMS I.12690 (176) Dunk Island, 17° 57' S, 146° 09' E, 1912; AMS I.15459-001 (188) Heron Island, 23° 27' S, 151° 57' E, 7 October 1964; AMS I.15571-010 (130) Capricorn Group, North West Island, 23° 18' S, 151° 42' E, 1969; AMS I.15647-075 (2, 133–182) One Tree Island, 23° 30' S, 152° 05' E, 13–14 m, 9 October 1968; AMS I.15681-057 (138) One Tree Island, 23° 30' S, 152° 05' E, 25 November 1969; AMS I.17445-068† (4, 52–155) One Tree Island, 23° 30' S, 152° 05' E, 3–4 m, 19 September 1968; AMS I.18739-026† (148) Lizard Island, Palfrey Island, 14° 42' S, 145° 27' E, 3–10 m, 21 November 1975; AMS I.18755-033* (98.4) Lizard Island, Palfrey Island, 14° 41' S, 145° 27' E, 4–8 m, 2 November 1975; AMS I.19108-024† (19) Lizard Island, 14° 40' S, 145° 28' E, 1–10 m, 17 November 1975; AMS I.19460-033† (99) Decapolis Reef, 14° 51' S, 145° 17' E, 10 m, 14 November 1975; AMS I.19607-085† (2, 30–102) Lizard Island, North Point Reef, 14° 40' S, 145° 27' E, 5–6 m, 30 January 1975; AMS I.20762-069† (2, 46–70) Lizard Island, 14° 41' S, 145° 27' E, 1–5 m, 1 February 1975; AMS I.20765-009 (31) Lizard Island, Palfrey Island, (bearing W .25 mile), 14° 42' S, 145° 27' E, 5 m, 1 January 1975; AMS I.20769-029† (105) Cape York, Halfway Island, 11° 23' S, 142° 57' E, 4–9 m, 18 February 1979; AMS I.20769-061† (111) Cape York, Halfway Island, 11° 23' S, 142° 57' E, 4–9 m, 18 February 1979; AMS I.20793-015 (44.0) Cape York, Clack Island, 14° 03' S, 144° 16' E, 3–7 m, 24 February 1979; AMS I.20982-036* (95.8) Lizard Island, 14° 41' S, 145° 27' E, 5–6 m, 28 November 1978; AMS I.21422-040* (130) Lizard Island, 14° 41' S, 145° 26' E, 1–8 m, 27 January 1975; AMS I.21495-001 (103) Lady Musgrave Reef, 23° 54' S, 152° 25' E, 5 m, 20 February 1980; AMS I.22578-006* (2, 106–157) Escape Reef, 15° 49' S, 145° 50' E, 6–10 m, 28 October 1981; AMS I.22582-005* (122) Escape Reef North, 15° 49' S, 145° 50' E, 14–17 m, 29 October 1981; AMS I.23702-083 (107) Lizard Island, Palfrey Island, 14° 42' S, 145° 27' E, 2–6 m, 29 December 1974; AMS I.31433-002† (1) Orpheus Island, 18° 37' S, 146° 30' E, 4 m, 11 November 1982; AMS I.31433-001† (164) Orpheus Island, 18° 37' S, 146° 30' E, 4 m, 11 November 1982; AMS I.44750-008* (112) Lizard Island, Mermaid Cove, 14° 38' 45" S, 145° 27' 17" E, 0–10 m, 17 September 2008; AMS IA.1314 (179) Bowen, 20° 01' S, 148° 15' E, 1923; AMS IA.207† (1) Palm Islands, 18° 47' S, 146° 34' E, 1921; AMS IA.2097 (1) Great Barrier Reef, Beaver Reef, 17° 50' S, 146° 30' E, 1924; AMS IA.2098 (1) 1924; AMS IA.2241 (169) Great Barrier Reef, North Barnard Island, 17° 40' S, 146° 10' E, 1924; AMS IA.2719† (1) 160, Hervey Bay, 25° S, 152° E, 1926; AMS IA.4615† (1) Capricorn Group, North West Island, 10° 40' S, 142° 07' E, May 1930; AMS IA.5003† (1) Capricorn Group, North West Island, 23° 17' S, 151° 42' 28" E, May 1931; AMS IB.7415† (155) Townsville, 19° 16' S, 146° 49' E, 1965; BMNH 1867.6.24.3* (161, lectotype of *Xiphocheilus fasciatus*, mount) Cape York; BMNH 1867.6.24.4* (143, paralectotype of *Xiphocheilus fasciatus*, mount) Cape York; BMNH 911.4.1.28–29 (2, 150–155) northern Queensland, Saville-Kent; BMNH 1933.1.25.92 (184) Capricorn Group; BPBM 13666 (65) Fitzroy Island; BPBM 41249 (140) Lizard Island, 25 November 1982; MCZ 36846 (2, 105–150) Gladstone; NMV A22006 (75) Lizard Island, 14° 40' 59.87" S, 145° 27' 45.00" E, November 1979; QMB I.4234 (1) off Cape Moreton, 27° 2' S, 153° 30' E; QMB I.4301† (?) off Cape Moreton, 27° 2' S, 153° 30' E; QMB I.4479† (?) Flinders Reef, off Cape Moreton, 26° 58' S, 153° 29' E; QMB I.5220 (1) off Cairns; QMB I.5388 (1) Moreton Bay, 27° 15' S, 153° 15' E; QMB I.5479† (?) Heron Island, 23° 27' S, 151° 55' E; QMB I.6750† (?) Magnetic Island, 19° 8' S, 146° 50' E; QMB I.7602 (1) Townsville, Lodestone Reef, 18° 41' S, 147° 5' E; QMB I.7619† (?) Dent Island, 20° 21' S, 148° 56' E; QMB I.7628† (?) Mooloolaba, 26° 40' S, 153° 15' E; QMB I.7998 (1) Proserpine, 20° 25' S, 148° 55' E; QMB I.8028 (1) Cape Moreton, Smith Rock, 27° S, 153° 29' E; QMB I.8029† (?) Cape Moreton, Smith Rock, 27° S, 153° 29' E; QMB I.8192 (1) Alexandra Headland, 26° 40' S, 153° 7' E;

QMB I.8821 (1) Cape York, 10° 41' S, 142° 32' E; QMB I.10207† (?) Cairns, July 1972; QMB I.10336† (?)Cape Bowling Green, Darley Reef, 19° 12' S, 148° 12' E, 23 March 1973; QMB I.11360† (?) Kelso Reef, 18° 24' S, 147° E; QMB I.14866† (?) Lizard Island, Yonge Reef, 14° 35' S, 145° 37' E, 6 January 1975; QMB I.15435† (?) Clack Reef, 14° 3' S, 144° 15' E, 1.5–7.6 m, 24 February 1979; QMB I.19109† (?)Cairns, Arlington Reef, 16° 42' S, 146° 4' E, 1980; QMB I.20105† (?) Frankland Islands, 17° 11' S, 146° 4' E, 6–10 m, November 1982; QMB I.31635† (?) Pompey Group, Renes Nook, 21° 17' S, 151° 31' E, 2.5–6 m, 13 March 2000; QMB I.31697† (?) Pompey Group, 21° 42' S, 151° 44' E, 3–5 m, 11 March 2000; QMB I.31719† (?) Pompey Group, 21° 2' S, 151° 28' E, 12.5–15 m, 15 March 2000; QMB I.31953† (?) Pompey Group, 21° 42' S, 151° 44' E, 3–6 m, 11 March 2000; QMB I.33355† (?) Swain Reefs, 21° 35' S, 152° 22' E, 3–5 m, 11 February 2001; QMB I.33430† (?) Swain Reefs, Gannet Cay, 21° 59' S, 152° 21' E, 2.5–3.5 m, 5 February 2001; QMB I.33485† (?) Swain Reefs, Gannet Cay, 21° 53' S, 152° 21' E, 4.5–7.5 m, 6 February 2001; QMB I.33638† (?) Frigate Reef, Swain Reefs, 21° 42' S, 152° 21' E, 4.5–6 m, 7 February 2001; QMB I.37049† (?) Star Reef, Swain Reefs, 21° 30' S, 152° 25' E, 4–6 m, 10 February 2001; QMB I.37611† (?) Shag Rock, North Stradbroke Island, 27° 24' S, 153° 31' E, 7–10 m, 14 December 2005; USNM 176924 (1) Great Barrier Reef; USNM 368244* (1) Fairfax Island Lagoon, 1966–1968; USNM 368246 (122) One Tree Island; WAM P.33532-005† (85) Great Barrier Reef, Lizard Island, 14° 38.45' S, 145° 27.17' E, 0–10 m, 17 September 2008. **New Caledonia**: AMS IB.4467 (154) Noumea, 1959; BPBM 27100 (35) 9 January 1979; MNHN 1980-0782 (162) 10 January 1979.

Choerodon frenatus. (47 specimens examined, 52–136 mm SL). **Australia, *New South Wales:*** AMS I.26536-013 (52) Namba, 29° 28' S, 153° 30' E–29° 33' S, 153° 25' E, 51 m; AMS I.31472-002 (2, 75–92) Yamba, 29° 24' S, 153° 33' E–29° 28' S, 153° 35' E, 66–73 m, 31 August 1990; AMS I.31472-005 (105) Yamba, 29° 24' S, 153° 33' E–29° 28' S, 153° 35' E, 66–73 m, 31 August 1990; AMS I.31473-001* (106) Iluka, 29° 20' S, 153° 34' E–29° 28' 28" S, 153° 36' E, 67–77 m, 7 May 1990; AMS I.31473-003* (6, 88.5–117) Iluka, 29° 20' S, 153° 34' E–29° 28' 2 S, 153° 36' E, 67–77, 7 May 1990; AMS I.32120-002 (4, 99–105) Clarence River, 29° 206' S, 152° 34' E–29° 25' 28" S, 153° 37' E, 67–73 m, 2 May 1990; AMS I.33510-005* (115) Clarence River, 29° 26' S, 153° 34' E–29° 25' 28" S, 153° 35' E, 64–68 m, 2 April 1990; AMS I.44773.030† (1) Ballina, 28° 33' 12" S, 153° 44' 30" E–28° 35' 12" S, 153° 44' 24" E, 69–71 m; AMS I.44773-013* (6, 86.5–127) Ballina, 28° 33' 12" S, 153° 44' 30" E–28° 35' 12" S, 153° 44' 24" E, 69–71 m; AMS I.44773-014† (143) Ballina, 28° 33' 12" S, 153° 44' 30" E, 28° 35' 12" S, 153° 44' 24" E, 69–71 m; AMS I.44773-015† (143) Ballina, 28° 33' 12" S, 153° 44' 30" E–28° 35' 12" S, 153° 44' 24" E, 69–71 m; CSIRO H 4773-07* (116) Yamba, 29° 24' S, 153° 35' E, 29° 23' S, 153° 35' E, 68–71 m, 17 April 1996; CSIRO H 4773-08* (116) Yamba, 29° 24' S, 153° 35' E–9° 23' S, 153° 35' E, 68–71 m, 17 April 1996; CSIRO H 4773-09* (79.8) Yamba, 29° 24' S, 153° 35' E–29° 23' S, 153° 35' E, 68–71 m, 17 April 1996; CSIRO H 4773-10* (5, 63.8–95.2) Yamba, 29° 24' S, 153° 35' E–29° 23' S, 153° 35' E, 68–71 m, 17 April 1996; NMV A2781 (2, 90–110) off Southport, 27° 42' 00.00" S, 153° 34' 48.00" E, 57 m, 6 November 1981; NMV A2792* (2, 110–115) off Southport, 27° 53' 59.99" S, 153° 40' 11.99" E, 83 m, 6 November 1981; ***Queensland***: AMS I.12536* (136, lectotype of *Choerodon frenatus*) Double Island Point, 25° 56' S, 153° 11' E; CSIRO H 6909-01 (94.3) Bowling Green Bay, 18° 54.20' S, 147° 49.93' E–18° 54.51' S, 147° 50.40' E, 64 m, 1 December 2003; CSIRO H 7898-01 (68) N of Abbot Bay, 19° 05.89' S, 148° 09.05' E, 13 December 2003; NMV A 31424-001 (4, 43.2–84.2) N of Townsville, 18° 27.94' S, 147° 03.66' E, 64 m, 29 November 2003; NMV A 31425-001 (89.3) and NMV A 31425-002 (2, 69.5–74.9) NE of Great Palm Island, 18° 29.15' S, 147° 00.10' E, 59 m, 29 November 2003; NMV A 31426-001 (104) NE of Whitsunday Group, 19° 28.36' S, 149° 29.79' E, 72 m, 7 December 2005; QMB I.475* (105, paralectotype of *Choerodon frenatus*) Double Island Point, 25° 56' S, 153° 15' E; QMB I.19601† (?) Noggin Reef, 17° 5' S, 146° 23' E, 51.2 m, 10 October 1979; QMB I.19624† (?) Geranium Passage, 17° 37' S, 146° 34' E, 64 m, 13 October 1979; QMB I.20326† (?) Flora Passage, 17° 3' S, 146° 14' E, 37–42 m, 1981; QMB I.23063† (?) Swain Reefs, 21° 17' S, 150° 47' E, 39 m, 16 September 1986; QMB I.23075† (?) Swain Reefs, 21° 7' S, 151° 27' E, 54 m, 13 September 1986; QMB I.23497† (?) Britomart Reef, 18° 19' S, 146° 38' E, 41 m, 20 January 1985; QMB I.26614† (?) Fraser Island, 25° S, 153° 30' E, 30 m, 16 May 1990; QMB I.29540† (?) Feather Reef, 17° 33' S, 146° 26' E, 47.5 m, 11 October 1979; QMB I.29707† (?) Stradbroke Island, Point Lookout, 27° 31' S, 153° 40' E, 80 m, 21 March 1995; QMB I.30199† (?) Stradbroke Island, Point Lookout, 27° 29' S, 153° 36' E, 73 m, 7 October 1995; QMB I.32922† (?) Llewellyn Reef, 23° 45' S, 152° 9' E, 47 m, 3 October 2000; QMB I.32935† (?) North West Island, 23° 3' S, 151° 38' E, 36 m, 10 October 2000; QMB I.33021† (?) Caloundra, 26° 48' S, 153° 29' E, 78 m, 21 February 2001; QMB I.35047† (?) 17° 54.3' S, 146° 48.9' E, 17° 54' S, 146° 49' E, 25 September 2003; QMB I.35367† (?) 18° 51.9' S, 147° 35.1' E–18° 52' S, 147° 35' E, 22 September 2003; QMB I.35566† (?) 18° 46.5' S, 147° 34.5' E–18° 46' S, 147° 34' E, 22 September 2003; QMB I.35598† (?) 18° 50.1' S, 147° 41.1' E–18° 50' S, 147° 41' E, 22 September 2003; QMB I.35605† (?) 18° 49.5' S, 147° 45.3' E–18° 49' S, 147° 45' E, 22 September 2003; QMB I.35878† (?) 19° 8.7' S, 147° 20.7' E, 27 m, 23 November 2003; QMB I.35934† (?) 19° 27.3' S, 148° 17.1' E, 50 m, 27 November 2003; QMB I.36244† (?) 21° 31.5' S, 150° 3.3' E, 28 m, 8 May 2004; QMB I.36255† (?) 18° 20.7' S, 146° 56.7' E, 65 m, 29 April 2004; QMB I.36282† (?) 18° 45.3' S, 147° 7.9' E, 52 m, 30 April 2004; QMB I.36378† (?) 23° 29' S, 151° 56.1' E, 40 m, 22 December 2004; QMB I.36389† (?) 23° 58.5' S, 152° 38.1' E, 45 m, 23 May 2004; QMB I.36687† (?) 15° 57.9' S, 147° 50.7' E, 58 m, 8 September 2004; QMB I.37338 (111) 19° 20.2' S, 148° 17.8' E, 52 m, 19 March 2005.

Choerodon gomoni. (30 specimens examined, 71.5–106 mm SL). **Coral Sea**: AMS I.41000-001 (105, paratype of *Choerodon gomoni*) Chesterfield Bank, 21° 05' S, 158° 57' 36" E, 73 m, 24 August 1988; BPBM 33840† (88.5, paratype of *Choerodon gomoni*) Chesterfield Bank, approximately 20° 45' S, 158° 50' 06" E, 75 m, 22 August 1988; BPBM 33850† (101, holotype of *Choerodon gomoni*) Chesterfield Bank, approximately 20° 45' S, 158° 35' 04" E, 82 m, 22 August 1988; MNHN 2001-2358† (92.5) same collection data as AMS I.41000-001; USNM 366799† (97.0) same collection data as BPBM33840; MNHN 2001-2358* (2, 97.3–99.5) Chesterfield Bank, 21° 05' 0" S, 158° 57' 6" E, 72 m, 24 August 1988; MNHN 2016-0093* (93.3) Chesterfield Bank, 21° 05' 0" S, 158° 57' 6" E, 22 August 1988. **New Caledonia**: MNHN 2016-0094* (2, 71.5–88.1) Iles Belep,

19° 38' 7" S, 163° 50' E, 35 m, 7 July 1986. **Australia, *Queensland***: CSIRO H 3436-04* (92.0) Cape York, Blackwood Channel, 11° 43.8' S, 143° 43.8' E, 24 m, 26 March 1993; CSIRO H 3441-01* (106) Cape York, Blackwood Channel, 11° 40.2' S, 143° 43.2' E, 28 m, 26 March 1993; CSIRO H 6926-07* (2, 81.1–88.8) Torres Strait, Cape York, 10° 21.84' S, 143° 40.26' E–10° 21.57' S, 143° 40.78' E, 40 m, 31 January 2004; CSIRO H 6926-09 (86.3) Torres Strait, Cape York, 10° 21.84' S, 143° 40.26' E–10° 21.57' S, 143° 40.78' E, 40 m, 31 January 2004; CSIRO H 7027-02* (2, 83.1–80.4) NE of Townsville, 18° 26.95' S, 147° 20.01' E, 60 m, 15 December 2003; CSIRO H 7460-03* (84.7) NE of Townsville, 18° 31.23' S, 147° 35.45' E, 76 m, 14 December 2003; CSIRO H 7894-01* (96.1) Torres Strait, Seven Reefs, 10° 19.14' S, 143° 44.99' E, 54 m, 31 January 2004; CSIRO H 7896-01* (84.6) 19.1091° S, 148.6238° E, 53.6 m, 13 December 2003; CSIRO H 6442-06* (85.2) 19.6653° S, 150.0759° E, 72.5 m, 5 December 2003; NMV A 31427-001 (104) Capricorn Group, North Reef, 23° 10.58' S, 151° 48.51' E, 49 m, 22 April 2004; NMV A 31428-001 (6, 76.3–81.0) NE of Townsville, 18° 26.95' S, 147° 20.01' E, 60 m, 15 December 2003; NMV A 31428-002 (5, 77.8–83.0) NE of Townsville, 18° 26.95' S, 147° 20.01' E, 60 m, 15 December 2003; QMB I.23062† (?) Swain Reefs 21° 23' S, 152° 12' E, 46 m, 19 September 1986; QMB I.34054† (?) Bunker Group, f 23° 47' S, 151° 58' E, 40 m, 10 October 2002; QMB I.36605† (?) 18.49.5' S, 148.12.3' E 18° 49' S, 148° 12' E, 72 m, 9 September 2004.

Choerodon graphicus. (25 specimens examined, 13.4–368 mm SL). **Australia, *Queensland***: AMS I.15458-001* (134) Heron Island, 23° 27' S, 151° 57' E, 1965; AMS I.15620-026 (2, 240–290) One Tree Island, 23° 30' S, 152° 05' E, 26 November 1966; AMS I.15683-045 (250) One Tree Island, 23° 30' S, 152° 05' E, 3–5 m, 30 November 1969; AMS I.17445-091* (2, 94.1–98.5) One Tree Island, 23° 30' S, 152° 05' E, 3–4 m, 19 September 1968; AMS I.20773-094 (18.2) Nymph Island, 14° 39' S, 145° 15' E, 1–2 m, 6 December 1978; AMS I.20787-067 (2, 13.4–17.3) Linnet Reef, 14° 47' S, 145° 21' E, 2–3 m, 9 December 1978; AMS I.20793-015 (47) Cape York, Clack Island, 14° 03' S, 144° 16' E, 3–7 m, 24 February 1979; AMS I.21260-015 (2, 28.3–30.8) Cape Tribulation, Noah Beach, 16° 06' S, 145° 28' E, 1 m, 12 September 1979; AMS I.34316-014† (6, 20–230) Townshend Island, 22° 12' 14" S, 150° 29' 25" E, 10 m, 16 September 1993; AMS I.34323-027* (157) Freshwater Beach, 22° 33' 42" S, 150° 47' 41" E, 6 m, 18 September 1993; AMS I.34324-009 (2, 39.2–44.5) Dome Island, 22° 24' 47" S, 150° 44' 39" E, 3–6 m, 19 September 1993; AMS I.34344-023 (20) Freshwater Beach, 22° 38' 50" S, 150° 47' 55" E, 2–4 m, 26 September 1993; AMS I.34370-014† (4, 58–77) Townshend Island, 22° 13' 52" S, 150° 34' 26" E–22° 13' 37" S, 150° 33' 49" E, 36–37 m, 24 October 1993; AMS I.34386-001† (114) Island Head Creek, 22° 21' 59" S, 150° 38' 41" E, 7–27 m, 25 October 1993; AMS IB.3527* (296, holotype of *Choerodon transversalis*) 23° 26' S, 151° 55' E, 1956; AMS IB.3908 (29) Heron Island, 23° 26' S, 151° 55' E, December 1957; BPBM 14373 (44) One Tree Island; CSIRO B 1385 (65.5) Heron Island, 23° 27' S, 151° 55' E, 2 June 1977; QMB I.944* (288, holotype of *Choerops graphicus*) Cardwell, 18° 16' S, 146° 1' E; QMB I.8848† (?)Maroochydore, 26° 39' S, 153° 7' E; QMB I.9743 (1) Bundaberg, Bargara Reef, 24° 52' S, 152° 21' E, 2.9 m, 6 June 1969; QMB I.10269† (?) Bundaberg, December 1972; QMB I.11323† (?) Bundaberg, 6 October 1973; QMB I.11376† (?) Heron Island, 23° 27' S, 151° 55' E; QMB I.13780† (?) Noosa River, 26° 24' S, 153° 4' E, January 1977; QMB I.27489† (?) Mooloolaba, 26° 40' S, 153° 15' E, 1 September 1991; QMB I.30310† (?) Southport, 27° 56' S, 153° 26' E, 6 m, 26 March 1996. **New Caledonia**: AMS IB.4436* (157) Noumea, 1959; BPBM 11413 (2, 187–287) 12 August 1971; USNM 438440* (212) Noumea, Ile Te Nd, 9 January 1961; USNM 438441* (233) 1963; USNM 206521* (368).

Choerodon gymnogenys. (20 specimens examined, 99.5–140 mm SL). **Arabian Gulf**: MCZ 14344* (2, 99.5–139) 1861. **Seychelles**: NSMT-P 116909* (127) Seychelles Bank, 4° 52.8' S, 55° 54' E, 58 m, 23 November 1968; NSMT-P 116910* (122) Seychelles Bank, 4° 1' S, 55° 55' E, 59 m, 30 November 1968; SAIAB 98483 (1) 4.74083° S, 56.4380° E, 9 November 2008; SAIAB 98487 (1) Seychelles Bank, 60 m; SAIAB 98483 (1) Seychelles Bank, 59–61 m; SAIAB 98491 (1) Seychelles Bank, 4.61683° S, 54.3643° E, 57–59 m, 12 November 2008. **St Brandon Shoal**: SAIAB 83986 (125) 16.8393° S, 59.5893° E, 58–60 m, 13 October 2008; SAIAB 84010 (110) 16.8393° S, 59.5893° E, 58–60 m, 13 October 2008; SAIAB 190077 (1) 52–53 m. **Zanzibar**: MCZ 4466 (110) 1862; MCZ 14343 (128) 1862; MCZ 24333 (4, 117–119) 1861; RUSI 2984* (3, 131–135); RUSI 2985* (119); BMNH 2016.6.6.1 (118) Playfair; BMNH 1864.11.15.28* (132, skin) Playfair; BMNH 1865.2.27.8 (118) Playfair; BMNH 1866.1.19.17* (140, lectotype of *Xiphocheilus gymnonenys*) Playfair; BMNH 1866.1.19.18* (132, paralectotype of *Xiphocheilus gymnonenys*) Playfair; BMNH 1868.5.30.138 (130) Playfair. **Mozambique**: SAIAB 81739 (2, 145–150) Xai-Xai, 26° 9.4' S, 32° 58.6' E, 43-45 m, 30 September 2007; SAIAB 81802 (131) off Ponta do Ouro, 26.835° S, 32.935° E, 56 m, 2 February 2007.

Choerodon jordani. (49 specimens examined, 23–136 mm SL). **Japan, *Okinawa***: OCF-P 20141113-1* (116) near Motobu, 6 October 2014; OCF-P 20141113-2* (136) near Motobu, 6 October 2014; URM-P 32669* (139) Naha fish market, 17 October 1994; USNM 62235* (120, holotype of *Choerodon jordani*) Naha, Albatross; USNM 74549* (120, paratype of *Choerodon jordani*) Naha, Albatross. **Australia, *Queensland***: AMS I.15625-030* (2, 114–129) Lizard Island, 23° 30' S, 152° 05' E, 32 m, 8 December 1966; AMS I.15637-035* (118) One Tree Island, 23° 30' S, 152° 05' E, 23–26 m, 5 October 1967; AMS I.17929-005* (79.2) One Tree Island, 23° 30' S, 152° 05' E, 34 m, 3 December 1973; AMS I.19476-012* (83.3) Yonge Reef, 14° 35' S, 145° 36' E, 20–35 m, 25 November 1975; AMS I.20716-002 (64) One Tree Island, off Wreck Bank 23° 30' S, 152° 05' E, 13 m, 13 September 1973; AMS I.22587-009 (24.7) Escape Reef North, 15° 49' S, 145° 50' E, 40 m, 31 October 1981; AMS I.22612-011* (93.8) Escape Reef North, 15° 49' S, 145° 50' E, 20 m, 1 November 1981; BPBM 14379* (3, 102–119) One Tree Island; CSIRO H 6748-04 (101) SE of Bunker Group, 23° 58.71' S, 152° 37.79' E, 54 m, 15 April 2004; CSIRO H 6913-03 (78.1) 23.3715° S, 151.9723° E, 44 m, 22 April 2004. ***Western Australia:*** WAM P.26068-005 (46) Houtman Abrolhos, Beacon Island, 28° 29' S, 113° 47' E, 40 m, 9 April 1978; WAM P.27591-002 (37) Houtman Abrolhos, Long Island, 28° 29' S, 113° 46' E, 30–33 m, 17 April 1982; WAM P.27595-011 (18, 23–82) Houtman Abrolhos, Long Island, 28° 29' S, 113° 46' E, 30–33 m, 19 April 1982; WAM P.25311-003 (4, 40.1–59.0) Houtman Abrolhos, Beacon Island, 28° 30' S, 113° 44' E, 0–30 m, 18 May 1975; WAM P.25313-004 (102) Houtman Abrolhos, Beacon

Island, 28° 30' S, 113° 44' E, 1–5 m, 19 May 1975; WAM P.27590-014 (3, 23–45) Houtman Abrolhos, Dicks Island, 28° 30' S, 113° 46' E, 30–32 m, 17 April 1982. **New Caledonia**: AMS I.17466-015* (72.2) Puetege Reef, 22° 22' S, 167° 08' E, 6–25 m, 15 June 1973; **Vanuatu**: AMS I.17474-013* (82.2) Efate Island, Undine Bay, 17° 31' S, 168° 21' E, 25 m, 24 June 1973. **Fiji**: BPBM 31163†, BPBM 31167†; USNM 287776† (2) Rotuma, Northern Reef, Due North of Motusa, 12.5° S, 177.083° E, 17 May 1986. **Tonga**: USNM 333201† (3) Tongatapu, W side of Hakau Mama'o Reef, 21° S, 175.215° W, 23 October 1993; USNM 334166† (2) Tongatapu, reef just N of Atata Island, on N side of reef, 21.0194° S, 125.228° W, 28 October 1993; USNM 334543† (4) W side of Makaha'a off the N central coast of Tongatapu Island, 21.1117° S, 175.16° W, 29 October 1993; USNM 336905† (1) Uoleva Island, outside fringing reef on W side, 19.8356° S, 174.422° W, 9 November 1993. **American Samoa**: BPBM 15017† (61).

Choerodon margaritiferus. (11 specimens examined, 82.8–115 mm SL). **Japan, *Okinawa***: OCF-P 20140825-3* (96.4) off Sesoko Island, 26° 39' N, 127° 51' E, 30 m, 24 August 2014; OCF-P 20140827-1* (107) off Sesoko Island, 26° 39' N, 127° 51' E, 30 m, 27 August 2014; OCF-P 20140827-2* (103) same collection data as OCF-P 20140827-1; OCF-P 20140827-3* (94.5) same collection data as OCF-P 20140827-1; OCF-P 20140827-4* (97.4) same collection data as OCF-P 20140827-1. **Philippines**: MNHN 2016-0095* (110) Philippines; USNM 135558* (115, holotype of *Choerodon margaritiferus*) Jolo; USNM 435387 (114) Cebu, Kawit, Medellen, Visayan Sea; USNM 435389* (115) Cebu, Kawit, Medellen, Visayan Sea; USNM 435391 (108) Cebu, Kawit, Medellen, Visayan Sea; **Indonesia**: CSIRO H 7218-03* (94.9) Lombok, Tanjung Luar, 8° 48' S, 116° 29' E, 26 January 2011, LM941; WAM P.31498-003* (82.8, paratype of *Choerodon gomoni*) Banggai Islands, Bangang Island, 1° 41.12' S, 123° 27.50' E, 30 m, 4 November 1998.

Choerodon monostigma. (116 specimens examined, 55.4–225 mm SL). **Australia, *Queensland***: AMS E.2531 (123) Bowen, 19° 55' S, 148° 18' E, 29 m, 3 August 1910; AMS E.2683 (9, 95–147) Pine Peak, 21° 25' S, 150° 08' E, 48 m, 1 August 1910; AMS E.2777 (4, 120–133) Gloucester Island, 19° S, 148° E, 64 m, 2 August 1910; AMS E.2778 (3, 100–125) same collection data as AMS E.2777; AMS E.2779* (2, 147–158) same collection data as AMS E.2777; AMS I.12518* (104, syntype of *Choerodon monostigma*) Pine Peak, 21° 31' S, 150° 16' E, 1910; AMS I.15557-204 (2, 118–123) Gulf of Carpentaria, 17° 25' S, 140° 10' E, 10.1 m, 27 November 1963; AMS I.16013-001* (120) Townsville, 19° 15' S, 146° 50' E, 1971; AMS I.20826-038 (99.9) Palm Islands, 18° 44' S, 146° 31' E, 20 m, 5 February 1979; AMS I.20827-009 (91.4) Cape York, Hannibal Island, 11° 33' S, 142° 57' E, 22–23 m, 15 February 1979; AMS I.34372-001 (80) Leicester Island, 22° 09' 42" S, 150° 26' 07" E, 22° 09' 56" S, 150° 25' 55" E, 28 m, 24 October 1993; AMS I.34373-002* (4, 55.4–71.4) Collins Island, Shoalwater Bay, 22° 11' 51" S, 150° 19' 18" E, 22° 11' 32" S, 150° 18' 26" E, 19 m, 24 October 1993; AMS I.34374-009 (3, 62–155) Shoalwater Bay, Akens Island, 22° 19' 54" S, 150° 15' 48" E, 22° 20' 08" S, 150° 14' 57" E, 9 m, 24 October 1993; AMS I.34398-030 (115) Port Clinton, 22° 33' 29" S, 150° 45' 19" E, 22° 33' 14" S, 150° 45' 25" E, 11 m, 25 October 1993; AMS IA.4196† (1) Port Curtis, 23° 55' S, 151° 25' E, December 1929; AMS IB.3303* (85.6) Repulse Bay, 20° 35' S, 148° 45' E, October 1954; AMS IB.3304* (77.8) Repulse Bay, 20° 35' S, 148° 45' E, October 1954; CSIRO A 2153 (102) Gulf of Carpentaria, 16° 34' S, 139° 56.4' E, 29.3 m, 29 August 1963; CSIRO A 2154 (96.1) Gulf of Carpentaria, 16° 34' S, 139° 56.4' E, 29.3 m, 29 August 1963; CSIRO A 2418 (70.2) Gulf of Carpentaria, 16° 40.0' S, 139° 57.7' E, 29.3 m, 28 August 1963; CSIRO A 2495 (85.1) Pisonia Island, 16° 29' S, 139° 51' E, 25.2 m, 2 September 1963; CSIRO A 2496 (71.4) Gulf of Carpentaria, Pisonia Island, 16° 29' S, 139° 51' E, 25.2 m, 2 September 1963; CSIRO A 2515 (96.3) Gulf of Carpentaria, Mornington Island, 15° S, 139° E, 45 m, 2 September 1963; CSIRO A 3255 (93.6) Gulf of Carpentaria, 16° 44.9' S, 140° 03.2' E, 20.1 m, 28 August 1963; CSIRO C 3718 (122) Gulf of Carpentaria, Weipa, 12° 00' S, 141° 30' E, 39 m, 13 December 1968; CSIRO C 4055 (134) Gulf of Carpentaria, Wellesley Islands, 16° 38.7' S, 140° 05.1' E, 25.2 m, 28 August 1963; CSIRO CA 2170 (146) Gulf of Carpentaria, Port Musgrave, 11° 04' S, 139° 58' E–11° 06' S, 139° 58' E, 56–57 m, 13 June 1981; CSIRO H 3300-02 (128) Clerke Island, 11° 53.1' S, 143° 16.0' E, 39 m, 13 January 1993; CSIRO H 3309-09 (126) Hannibal Island, off Shelburne Bay, 11° 37.9' S, 143° 01.7' E–11° 39.1' S, 143° 02.3' E, 22 m, 14 January 1993; CSIRO H 3895-15 (100) Cape Grenville, 11° 37' S, 143° 28' E, 18 m, 21 October 1994; CSIRO H 3932-02 (100) Cape Grenville, 11° 37' S, 143° 28' E, 18 m, 21 October 1994; CSIRO H 6736-06* (78.4) Torres Strait, NE of Bramble Cay, 9° 05.14' S, 143° 56.40' E, 51 m, 27 January 2004; CSIRO H 6895-06 (88.4) Torres Strait, Endeavour Strait, 10° 49.22' S, 142° 09.42' E–10° 49.76' S, 142° 09.55' E, 15 m, 19 January 2004; CSIRO H 6900-02 (55.8) Torres Strait, NE of Banks Island, 9° 51.72' S, 142° 35.40' E, 13 m, 21 January 2004; CSIRO H 6904-04* (119) Torres Strait, NE of Newcastle Bay, 10° 28.95' S, 142° 52.48' E, 19 m, 12 January 2004; CSIRO H 6927-02* (102) Torres Strait, NE of Cape York Peninsula, 10° 09.57' S, 143° 07.04' E, 25 m, 1 February 2004; CSIRO H 6936-03* (86.8) Torres Strait, NE of Cape York Peninsula, 10° 12.32' S, 143° 09.43' E, 29 m, 1 February 2004; CSIRO H 7018-04 (4, 83–100) Gulf of Carpentaria, Mornington Island, 16° 19.00' S, 138° 39.53' E–16° 18.16' S, 138° 38.12' E, 24–23 m, 23 February 2009; CSIRO H 7677-02* (112) W of Hook Island, 20° 06.04' S, 148° 41.01' E, 4 December 2003; NMV A2950 (2, 90–105) Gulf of Carpentaria, 105 km WNW of Cullen Point, 11° 25' 11.99" S, 141° 01' 48.00" E, 45 m, 8 September 1982; NMV A2961 (2, 90–130) Gulf of Carpentaria, 130 km W of Crab Island, 10° 49' 12.00" S, 140° 54' 29.99" E, 43 m, 10 September 1982; NMV A2967 (105) Gulf of Carpentaria, 140 km W of Prince of Wales Island, 10° 39' 00.00" S, 140° 45' 00.00" E, 46 m, 13 September 1982; NMV A3112 (125) 12 km SW of Cape Grenville, 12° 04' 40.79" S, 143° 10' 10.80" E, 10 m, 27 February 1983; NMV A3132* (2, 107–130) Gulf of Carpentaria, 180 km W of Cape York, 10° 50' 13.80" S, 140° 55' 06.59" E, 44 m, 26 February 1983; NMV A3136 (2, 105–110) Gulf of Carpentaria, 60 km W of Weipa, 12° 36' 18.00" S, 141° 19' 55.80" E, 40 m, 25 February 1983; NMV A3156 (127) Great Barrier Reef, near Haggerstone Island, 12° 03' 16.92" S, 143° 15' 10.08" E, 26–29 m, 27 February 1983; NMV A13295 (121) 11 km NNE of Cape Grenville, 11° 53' 05.99" S, 143° 16' 12.00" E, 39 m, 13 January 1993; NMV A13296 (2, 118–225) 315 km E of Cape Wessel, 11° 06' 35.99" S, 139° 42' 24.00" E, 54 m, 5 February 1993; NMV A13297 (105) Gulf of Carpentaria, 10° 54' 29.99" S, 140° 34' 18.00" E, 51 m, 5 February 1993; NMV A13298 (119) 16 km N of Cape Grenville, 11° 48' 42.00" S, 143° 12' 42.00" E, 31 m, 13 January 1993;

NMV A13299* (119) Gulf of Carpentaria, 12° 35' 23.99" S, 140° 46' 12.00" E, 60 m, 30 January 1993; NMV A13300* (125) 12 km ESE of Hannibal Island, 11° 37' 54.00" S, 143° 01' 41.99" E, 22 m, 14 January 1993; NMV A13301 (154) Gulf of Carpentaria, 11° 16' 54.00" S, 140° 01' 41.99" E, 59–51 m, 5 February 1993; NMV A 31433-001* (128) NE of Shoalwater Bay, 21° 45.31' S, 150° 57.76' E, 73 m, 8 December 2003; NMV A 31434-001* (82.6) NE of Cairns, 16° 47.27' S, 145° 58.01' E, 39 m, 17 October 2004; QMB I.1563* (131, paralectotype of *Choerodon monostigma*) Pine Peak, 21° 31' S, 150° 16' E, 47.5 m, 1910; QMB I.9904 (1) Lindeman Island, 20° 27' S, 149° 2' E, 1936; QMB I.11251† (?) Townsville, 19° 16' S, 146° 49' E; QMB I.11252† (?) Mackay, 21° 9' S, 149° 12' E; QMB I.11801† (?) Prudhoe Island, 21° 19' S, 149° 41' E; QMB I.15732† (?) Palm Islands, 18° 44' S, 146° 35' E, 20 m, 5 February 1979; QMB I.17552† (?) Torres Strait, P D Sand Cay, 10° 10' S, 143° 14' E, 6 December 1974; QMB I.17635† (?) Torres Strait, Aureed Island, 9° 57' S, 143° 17' E, 17 November 1974; QMB I.17636† (?) Torres Strait, P D Sand Cay, 10° 11' S, 143° 14' E, 18 October 1974; QMB I.17637† (?) Torres Strait, Stephen to Bramble Cay, 9° 20' S, 143° 42' E, 13 October 1974; QMB I.17638† (?) Torres Strait, Yam Island, 9° 53' S, 142° 45' E, 22 November 1974; QMB I.17639† (?) Torres Strait, Caldbeck Reef, 10° 10' S, 143° 13' E, 4 December 1974; QMB I.17640† (?) Torres Strait, Keats Island, 9° 41' S, 143° 27' E, 8 October 1974; QMB I.17641† (?) Torres Strait, 9° 26' S, 142° 50' E, 7.3 m, 24 March 1974; QMB I.17642† (?) Torres Strait, 9° 24' S, 142° 54' E, 7.3–9.1 m, 23 March 1974; QMB I.17643† (?) Torres Strait, 9° 30' S, 142° 59' E, 7.3–8.2 m, 25 April 1974; QMB I.17644† (?) Torres Strait, 9° 35' S, 142° 47' E, 26 March 1974; QMB I.17645† (?) Torres Strait, 9° 37' S, 142° 54' E, 8.2 m, 27 March 1974; QMB I.17646† (?) Torres Strait, 9° 55' S, 141° 33' E, 12.8–14.6 m, 31 May 1974; QMB I.17647† (?) Torres Strait, 9° 40' S, 142° 56' E, 29 March 1974; QMB I.17648† (?) Torres Strait, 9° 51' S, 142° 49' E, 14.6–26.8 m, 5 April 1974; QMB I.18163† (?) Cape Weymouth, 12° 29' S, 143° 20' E, 18.3 m, 24 September 1979; QMB I.23129† (?) Hinchinbrook Island, 18° 27' S, 146° 25' E, 24 m, 15 April 1985; QMB I.26705† (?) Torres Strait, Warrior Reefs, 9° 48' S, 142° 58' E, 30 March 1990; QMB I.26845† (?) Torres Strait, Warrior Reefs, 9° 48' S, 142° 58' E, 27 March 1990; QMB I.27405† (?) Gulf of Carpentaria, 12° 29' S, 139° 42' E, 58 m, 8 December 1990; QMB I.27765† (?) Gulf of Carpentaria, 11° S, 140° 41' E, 47 m, 4 December 1990; QMB I.27903† (?) Gulf of Carpentaria, 12° 29' S, 139° 42' E, 58 m, 8 December 1990; QMB I.36056† (?) 20° 17.1' S, 148° 53.1' E, 35 m, 29 November 2003; QMB I.36337† (?) 23° 22.5' S, 151° 2.7' E, 20 m, 25 January 2004; QMB I.36573† (?) 20° 51.3' S, 149° 33.3' E, 43 m, 30 September 2004; QMB I.36588† (?) 21° 11.1' S, 150° 19.5' E, 53 m, 29 September 2004; QMB I.36706† (?) 21° 11.7' S, 149° 57.3' E, 48 m, 29 September 2004; QMB I.36780† (?) 22° 00.3' S, 149° 32.7' E, 11 m, 5 October 2004; ***Northern Territory:*** AMS I.21842-029† (9, 80–125) Arafura Sea, 10° 35' S, 133° 45' E, 10° 37' S, 133° 47' E, 60 m, 16 November 1980; AMS I.21944-005† (140) Arafura Sea, 11° 35' S, 135° 00' E, 11° 34' S, 134° 54' E, 35 m, 19 November 1980; CSIRO B 2082 (8, 70.5–115) Darwin, 12° 15.0' S, 130° 03.0' E–12° 13.0' S, 130° 02.0' E, 50 m, 3 July 1980; CSIRO C 3725 (152) Arafura Sea, 08° 57' S, 137° 39' E, 58 m, 4 December 1968; CSIRO CA 2548 (90) Groote Eylandt, Tasman Point, 14° 20' S, 136° 10' E, 18 m, 27 May 1981; NMV A1731 (7, 115–170) Arafura Sea, 10° 10' 11.99" S, 135° 58' 11.99" E, 52 m, 22 November 1980; NTM S.01080-001† (82) York Sound, July 1975; NTM S.11684-007† (3, 115–167) Arafura Sea, Cape Wessel, 10° 09' S, 136° 48' E, 57 m, 17 March 1985; NTM S.11613-019† (136) Arafura Sea, Cape Wessel, 10° 15' 00" S, 136° 19' 59" E, 10 March 1985; NTM S.11953-005† (2, 76–93) Arafura Sea, Goulburn Island, 10° 34' 59" S, 134° 33' 00" E, 55 m, 25 August 1986; NTM S.10052-001† (118) Van Diemen Gulf, Murganella Creek, 11° 52' 01" S, 132° 34' 59" E, 17 January 1978; NTM S.10051-001† (3, 59–125) Van Diemen Gulf, Murganella Creek, 11° 52' 01" S, 132° 31' 01" E, 26 October 1977; NTM S.11786-012† (5, 109–156) Arafura Sea, Goulburn Islands, 10° 49' 01" S, 133° 49' 59" E, 59 m, 7 December 1985; NTM S.16134-026 (63)† Bynoe Harbour, Knife Island, 12° 42' 04" S, 130° 35' 31" E, 7 m, 20 April 2002; NTM S.13790-002† (28) Beagle Gulf, Bynoe Harbour, 12° 40' 59" S, 130° 33' 00" E, 9 m, 7 October 1993; NTM S.10069-001† (83) Darwin Harbour, Shoal Bay, 12° 16' 59" S, 130° 58' 01" E, 5 April 1977; NTM S.13534-002† (3, 120–127) Arafura Sea, 10° 30' 18" S, 134° 30' 00" E, 58 m, 24 September 1992; NTM S.16200-002† (14) Port Patterson, South Moira Reef, 12° 31' 01" S, 130° 31' 01" E, 8 November 2002; NTM S.12935-004† (140) Arafura Sea, Croker Island, 10° 43' 59" S, 132° 31' 01" E, 55 m, 21 October 1990; NTM S.13282-022† (95) Beagle Gulf, Charles Point, 12° 15' 25" S, 130° 37' 52" E, 29 m, 2 September 1992; NTM S.12938-005† (119) Arafura Sea, 10° 48' 00" S, 133° 05' 60" E, 60 m, 21 October 1990; NTM S.12942-006† (2, 108–155) Arafura Sea, 11° 22' 01" S, 134° 07' 01" E, 22 October 1990; NTM S.12948-004† (3, 111–150) Arafura Sea, 10° 45' 00" S, 133° 52' 59" E, 61 m, 24 October 1990; NTM S.12952-018† (152) Arafura Sea, 10° 34' 01" S, 134° 28' 59" E, 60 m, 24 October 1990; NTM S.12961-001† (144) Arafura Sea, 11° 22' 59" S, 136° 05' 60" E, 34 m, 26 October 1990; NTM S.16159-036† (39) Port Patterson, Moira Reef, 12° 30' 50" S, 130° 30' 40" E, 8 November 2002; NTM S.13718-012† (29) Darwin Harbour, Jones Creek, 12° 33' 18" S, 130° 52' 59" E, 4 m, 15 July 1993; NTM S.13724-005† (25) Darwin Harbour, Pearl Raft Creek, 12° 31' 01" S, 130° 54' 00" E, 3 m, 16 July 1993; NTM S.13735-012† (2, 14–15) Darwin Harbour, West Arm, 12° 33' 18" S, 130° 46' 41" E, 12 m, 9 September 1993; NTM S.13736-015† (15) Darwin Harbour, West Arm, 12° 34' 19" S, 130° 45' 25" E, 8 m, 9 September 1993; NTM S.13927-002† (16) Darwin Harbour, Fannie Bay, 12° 25' 55" S, 130° 48' 36" E, 12 m, 18 April 1994; NTM S.13333-006† (3, 129–175) Arafura Sea, 11° 19' 01" S, 134° 28' 01" E, 39 m, 23 October 1990; NTM S.10050-002† (3, 62–98) Darwin Harbour, Shoal Bay, 12° 16' 01" S, 130° 54' 00" E, 4 April 1977; NTM S.15134-001† (70) Timor Sea, Flat Top Bank, 12° 27' 18" S, 129° 13' 37" E, 60 m, 12 October 1996; NTM S.15916-019† (4, 23–26) Kakadu National Park, Field Island, 12° 03' 25" S, 132° 24' 32" E, 1 m, 19 August 2004; NTM S.11657-038† (2, 150–170) Arafura Sea, Cape Wessell, 10° 24' 00" S, 136° 30' 00" E, 38.5 m, 2 February 1985; NTM S.11655-013† (113) Arafura Sea, Cape Wessell, 10° 25' 01" S, 136° 33' 00" E, 60 m, 1 February 1985; NTM S.11660-022† (4, 120–146) Arafura Sea, Cape Wessell, 10° 24' 00" S, 136° 35' 60" E, 62 m, 3 February 1985; NTM S.11658-019† (148) Arafura Sea, Cape Wessell, 10° 24' 00" S, 136° 31' 59" E, 56.7 m, 2 February 1985; NTM S.16951-004† (5, 18–26) Darwin Harbour, East Point, 12° 25' 01" S, 130° 48' 18" E, 16 November 1982; NTM S.16750-002† (82) Blue Mud Bay, Nicol Island, 13° 27' 00" S, 136° 26' 60" E, 22 m, 27 June 1987; NTM S.11612-037† (2, 133–158) Arafura Sea, Cape Wessel, 10° 25' 59" S, 136° 25' 59" E, 57 m, 9 March 1985; NTM S.17296-002† (46) Beagle

Gulf, Lorna Shoals, 12° 12' 00" S, 129° 59' 17" E, 41 m, 20 September 2009; WAM P.14260* (70.2) Darwin, 12° 27' S, 130° 50' E, 4 September 1965; WAM P.14426-001† (1) same collection data as WAM .P14260; WAM P.14427-001 (1) same collection data as WAM P.14260. ***Western Australia***: AMS I.20402-011 (124) Bonaparte Archipelago, Admiralty Gulf to Camden Sound, 14° 00' S, 126° 00' E, 15° 20' S, 124° 25' E, 12–60 m, April 1978; AMS I.22801-012 (2, 72–87) North West Shelf, Port Hedland, 19° 32' S, 118° 09' E, 50–52 m, 26 March 1982; AMS I.22802-009* (2, 121–143) North West Shelf, Port Hedland, 19° 39' S, 117° 53' E, 52–53 m, 26 March 1982; CSIRO CA 463 (119) Lagrange Bay, 18° 34' S, 120° 21' E–18° 30' S, 120° 23' E, 85–88 m, 2 June 1978; CSIRO CA 2169 (114) Forestier Island, 19° 45.0' S, 118° 22.0' E–19° 46.0' S, 118° 21.0' E, 38 m, 3 June 1980; CSIRO H 3240-01 (101) Port Hedland, 19° 15.7' S, 118° 27.5' E–19° 15.0' S, 118° 29.1' E, 75–76 m, 3 October 1990; CSIRO H 4352-01 (120) Port Hedland, 19° 29.5' S, 118° 52.2' E–19° 30.0' S, 118° 52.1' E, 37 m, 24 October 1983; CSIRO H 4353-01 (2, 72–88) Port Hedland, 19° 29.6' S, 118° 52.2' E–19° 29.7' S, 118° 52.6' E, 38–37 m, 25 October 1983; NTM S.10959-027† (3, 101–139) Port Hedland, 19° 01' 01" S, 119° 25' 01" E, 18 April 1983; NTM S.11671-015† (145) North West Shelf, Rowley Shoals, 19° 03' 00" S, 118° 24' 00" E, 88 m, 2 June 1985; NTM S.11688-009† (2, 102–149) North West Shelf, King Sound, 16° 31' 59" S, 121° 25' 59" E, 42 m, 17 April 1985; NTM S.14362-013† (3, 61–99) Holothuria Banks, West Holothuria Reef, 13° 25' 12" S, 125° 39' 18" E, 50 m, 12 June 1996; NTM S.15060-003 (96) Joseph Bonaparte Gulf, 13° 13' 59" S, 128° 07' 01" E, 90 m, 14 July 1997; NTM S.16591-016† (148) Holothuria Banks, Penguin Shoal, 12° 58' 59" S, 125° 35' 60" E, 67 m, 27 June 1988; WAM P.26259-009 (86) Cape Leveque, 16° 20' S, 122° 19' E, 50–52 m, 23 June 1978; WAM P.33928-001† (82) Kimberley, 13.79011647° S, 127.2439084° E, 54.5–55.1 m, 10 June 2013. **Indonesia**: WAM P.33092-002† (8, 40–103) West Papua, Ogar Island, 02° 39' S, 132° 30' E, 8–25 m, 22 March 2009.

Choerodon oligacanthus. (68 specimens examined, 50.5–250 mm SL). BMNH 1870.6.14.63 (1) unknown locality, Day. **Malaysia**: AMS I.28082-027* (97.6) 1922; MCZ 30358 (73.8) Penang; RMNH 17917 (50.5) Port Dickson. **Singapore**: AMS I.28997-002* (121) February 1923; AMS IA.3275* (134) 1923; AMS IA.3276* (138) 1923; CAS 29237* (93.1); CAS 30378 (1); CAS 34609 (1); MCZ 1133 (111); CAS 34609 (1); MCZ 1133 (111); MCZ 25258 (222); MCZ 14374 (9, 70.5–143). **Borneo**: CAS 27769 (1); CAS 33637 (1) 5.989066° N, 118.166168° E, 29 June 1929. **Sabah**: USNM 152167 (1) Sandakan; USNM 153485 (1) Sandakan; USNM 153980 (7) Sandakan. **Philippines**: BPBM 22093* (2, 113) Cebu; CAS 20653 (1); CAS 25931 (1) Palawan, 11.896447° N, 120.018080° E, 6 May 1931; CAS 25932 (2) Tawi-Tawi, 4.717582° N, 119.401948° E, 9 August 1931; NSMT–P 50478* (65.3) Cebu fish market, 13 February 1979; USNM 51988* (250) Negros Island; USNM 152152 (1) Cebu; USNM 153484 (1) Palawan; USNM 153981 (1) Ulugan Bay, near mouth of Baheli River; USNM 153982 (1) Cebu; USNM 153983 (3) Cebu; USNM 153985 (2) Iloilo; USNM 153986 (1) Sirinao Island, Nakoda Bay; USNM 200221* (212) Palawan, Puerto Princessa. **Batavia**: MCZ 14371 (2, 138–151); MCZ 22798 (248). **Indonesia**: CSIRO H 7986-01* (224) Bali, Kedonganan, 8° 45' S, 115° 09' E, 25 February 2009; CSIRO H 7987-01* (229) same locality as CSIRO H 7986-01, 1 October 2009; CSIRO H 7406-07 (107) Lombok, Tanjung Luar, 8° 48' S, 116° 29' E, 4 March 2009; CSIRO H 7694-02* (142) same collection information as CSIRO H 7987-01; NMV 46066 (76.4) Bleeker collection; NMV A 31430-001* (201) same locality as CSIRO H 7986-01, 2 October 2009; MZB 23113* (177) same collection information as CSIRO H 7986-01; MZB 23114 (94.8) same collection information as CSIRO H 7406-07; RMNH 6532* (4, 77.0–88.6, 88.6 mm SL specimen regarded as lectotype of *Crenilabrus oligacanthus*) Sumatra, Riau.

Choerodon robustus. (32 specimens examined, 146–285 mm SL). **Unknown locality**: BMNH 1867.3.9.20* (242, skin). **Red Sea**: BPBM 20841 (265) Gulf of Aqaba, Eilat; MNHN 1966-196* (200) Gulf of Suez; MNHN 1966-197* (176) Gulf of Suez. **Persian Gulf**: BPBM 21188 (203) Bahrain. **INDIAN OCEAN, Somalia**: USNM 438442* (185) 09° 41' N, 51° 03' E, 60–70 m. **Mauritius**: BMNH 1840.12.12.10* (275, holotype of *Xiphocheilus robustus*) Janvier; BMNH 1941.4.21.6* (236); MCZ 5803 (224); MCZ 6101 (263); RMNH 6534* (204, holotype of *Choerops dodecacanthus*). **Reunion**: MNHN A.8264* (275, syntype of *Cossyphus maxillosus*, mount); MNHN A.8265* (245, syntype of *Cossyphus maxillosus*, mount); MNHN A.8266* (256, syntype of *Cossyphus maxillosus*, mount). **Seychelles**: ANSP 114058* (3, 204–228) Curieuse Island, 20 m, 23 February 1964. **Sri Lanka**: BMNH 1891.10.29.32* (236, skin) H. Nevill; USNM 438443 (234) Wadge Banks, 07° 52' N, 77° 09' E, 51 m; USNM 206124* (278) Wadge Banks. **WESTERN PACIFIC OCEAN, Japan, *Okinawa***: NSMT-P 66574* (188) Nakagusuku Bay, 7 November 2000; SMBL-F 73327 (285) Naha fish market, 100 m, 6 August 1973; SMBL-F 73328 (261) same collection data as SMBL-F 73324. URM-P 18745* (199) off Yasuda, 200 m, 25 October 1986; URM-P 23316* (207) Naha fish market, 30 December 1989; URM-P 24632* (164) Naha fish market, 20 October 1990; URM-P 24825* (221) Naha fish market, 14 November 1990; URM-P 40999* (237) Awase, 7 November 1990. **Indonesia**: CSIRO H 7989-01* (146) West Java, Pelabuhanratu, 7° 00' S, 106° 30' E, 11 March 2009; CSIRO H 7990-01* (194) West Java, Pelabuhanratu, 7° 00' S, 106° 30' E, 10 March 2009; CSIRO H 7361-02* (229) Bali, Kedonganan, 8° 45' S, 115° 09' E, 14 March 2010; MZB 23115* (220) West Java, Pelabuhanratu, 07° 02' S, 106° 32' E, 14 October 2008; NMV A 31431-001* (204) same collection data as CSIRO H 7361-02.

Choerodon rubescens. (15 specimens examined, 54.4–521 mm SL). **Australia, *Western Australia***: AMS I.20230-010* (111) Cockburn Sound, Woodman Point, 32° 08' S, 115° 45' E, 1–9 m, 27 March 1978; AMS I.44129.002† (1) May 2007; AMS I.44129-001† (390) May 2007; BMNH 1844.2.15.54* (521, mount) Houtman Abrolhos; BMNH 1844.2.15.66* (mount) Harvey River; BMNH 1844.2.15.68* (279, holotype of *Choerops rubescens*, skin) Houtman Abrolhos; CSIRO H 4875-01* (380) October 1998; CSIRO H 4875-02* (324) October 1998; CSIRO H 4875-03* (380) October 1998; NMV A2495 (252) Houtman Abrolhos, off Beacon Island in Goss Passage, 28° 28' 48.00" S, 113° 46' 11.99" E, 30 m, 19 April 1982; WAM P.4186-001* (177) Lancelin Island, 31° 00' S, 115° 19' E; WAM P.4515-001† (1) Shark Bay, 25° 21' S, 113° 44' E, November 1958; WAM P.4514-001† (1) Peron Peninsula, 26° 03' S, 113° 37' E, 11 January 1958; WAM P.25310-002* (2, 54.4–67.7) Houtman Abrolhos, Beacon Island, 28° 30' S, 113° 44' E, 2–15, 18 May 1975; WAM P.25749-

001* (206) Rottnest Island, Kingston Reefs, 31° 59' S, 115° 33' E, 8–10 m, 3 March 1977; WAM P. 25759-001* (102) Rottnest Island, Charlotte Point, 31° 59' S, 115° 29' E, 2–4 m, 10 March 1977; WAM P.25913-002† (183) Garden Island, 32° 12' S, 115° 40' E, January 1977; WAM P.27955-018 (60) Port Denison, 29° 16' S, 114° 55' E, 9–10 m, 13 April 1983; WAM P.27957-026† (42) Port Denison, 29° 16' S, 114° 55' E, 7–8 m, 14 April 1983; WAM P.32774-001† (52) Cervantes, 30° 33.290' S, 115° 05.508' E, 3.9 m, 9 March 2006.

Choerodon schoenleinii. (113 specimens examined, 21–530 mm SL). **Japan**: USNM 57670* (2, 196–229). **China**: ANSP 76600 (1) Hong Kong; BMNH 1968.3.11.15* (280, holotype of *Cossyphus cyanostolus*, skin); BMNH 1968.3.11.16* (124, holotype of *Cossyphus ommopterus*, skin); CAS 27904 (1) Hong Kong; MCZ 14377 (1) Hong Kong; USNM 153846* (218) Hong Kong; USNM 153847* (227) Hong Kong; USNM 153849 (227) Hong Kong; USNM 148431 (1) Shanghai. **Taiwan**: USNM 192861 (2) Peng-Hu Hsien; USNM 276983* (104) Yeh-liu. **Vietnam**: MNHN 97-187* (410) Tonkin Gulf. **Thailand**: NSMT-P 55149* (175) Rayong, Ko Samet, Ao Phao, 4 m, 29 November 1986. **Philippines**: CAS 25933 (150) Sulu Archipelago, Jolo, 5.925203° N, 121.153284° E–5.925203° N, 121.153284° E, 2 August 1931; CAS 32363 (2, 159–187) Sulu Archipelago, Jolo, 5.925203° N, 121.153284° E–5.925203° N, 121.153284° E, 30 December 1936; CAS 38730 (166) Zamboanga, 6.907358° N, 122.069655° E–6.907358° N, 122.069655° E, 3 September 1940; USNM 88065 (2) Masbate; USNM 150210* (150) Zamboanga; USNM 152166* (250) Zamboanga; USNM 152252 (1) Masbate; USNM 153470* (389) Cebu; USNM 153630 (1) Masbate, Cataingan Bay; USNM 153628 (2) Cebu; USNM 153629 (2) Cebu; USNM 153469* (223) Cebu; USNM 135559 (1) Luzon, Ragay Rive. **Singapore**: MCZ 14373 (2). **Sabah**: CAS 27894 (1) Sandakan, 5.989066° N, 118.166168° E, 29 June 1929. **Indonesia**: ANSP 27703 (1) Sumatra, Padang; CSIRO H 7899-03 (320) Bali, Kedonganan, 08° 45' S, 115° 09' E, 21 October 2008; CSIRO H 7362-02 (160) Bali, Kedonganan, 8° 45' S, 115° 09' E, 21 January 2011; MNHN A7395* (110) Sulawesi; MZB 23116 (128) Bali, Kedonganan, 8° 45' S, 115° 09' E, 1 October 2009; NMV 46065* (122); USNM 153631 (1) Sulawesi, Macassar; WAM P.31305-005 (86) Riau Islands, Bintan Island, 01° 11' N, 104° 19' E, 13 May 1997. **Timor**: RMNH 2364* (140). **Papua New Guinea**: AMS IB.4761† (1) 06° 25' S, 147° 12' E, 1960; WAM P.28194-036 (262) Daru Island, Daru, 9° 09' S, 143° 17' E, 3–4 m, 6 November 1983. **Australia**: AMS I.2972† (1) unknown locality, 1891; AMS I.4842† (1) unknown locality, 1901; AMS IA.69† (1) unknown locality, 1920. ***New South Wales:*** AMS I.1833† (1), Richmond River, 29° 04' S, 153° 21' E, 1888; AMS I.1845† (1) Clarence River, 28° 40' S, 152° 21' E, 29° 30' S, 153° 06' E, 1888; AMS I.1846† (1) Clarence River, 28° 40' S, 152° 21' E, 29° 30' S, 153° 06' E, 1888; AMS I.2342† (1) Clarence River, 29° 30' S, 153° 06' E, 1888; AMS I.3298† (1) Sydney Fish Market, 1894; AMS I.4181† (1) Port Jackson, 33° 51' S, 151° 16' E, 1899; AMS I.4181.001† (1) Port Jackson, 33° 51' S, 151° 16' E, 1899; USNM 59849* (423) N coast. ***Queensland***: AMS A.7408 (152) Torres Strait, 09° S, 142° E–10° S, 143° E, 1879; AMS A.7409 (157) Torres Strait, 09° S, 142° E–10° S, 143° E, 1879; AMS A.7408† (1) Torres Strait, 09° S, 142° E, 10° S, 143° E, 1879; AMS A.7409† (1) Torres Strait, 09° S, 142° E, 10° S, 143° E, 1879; AMS I.11937† (1) Cape York, 10° 00' S, 142° 00' E, 1907; AMS I.12520 (134) Great Sandy Strait, 25° 35' S, 152° 58' E, 1912; AMS I.12633 (1) Masthead Island, 23° 32' S, 151° 44' E, August 1912; AMS I.15557-205* (3, 95.5–181) Gulf of Carpentaria, 17° 25' S, 140° 10' E, 10.1 m, 27 November 1963; AMS I.16360-001* (210, holotype of *Choerops notatus*) Cape Grenville, 12° S, 143° 15' E, 1875; AMS I.19474-001* (133) Linnet Reef, 14° 47' S, 145° 21' E, 25, 22 November 1975; AMS I.20753-010* (60.5) Lizard Island area, 2 miles NW of Nymph Island, 14° 36' S, 145° 14' E, 14–15 m, 8 February 1979; AMS I.20754-013 (58.3) Lizard Island area, 10 miles NW of Nymph Island, 14° 33' S, 145° 06' E, 16 m, 8 February 1979; AMS I.20787-075 (47) Linnet Reef, 14° 47' S, 145° 21' E, 2–3 m, 9 December 1978; AMS I.33802-001 (1) Lizard Island, Mermaid Cove, 14° 40' S, 145° 28' E, 4 m, 17 January 1993; AMS I.34302-003† (237) Shoalwater Bay, Sabina Point, 22° 23' 49" S, 150° 18' 15" E, 2 m, 14 September 1993; AMS I.34311-021 (104) Shoalwater Bay, Collins Island, 22° 14' 47" S, 150° 19' 08" E, 3 m, 15 September 1993; AMS I.34311-028 (138) Shoalwater Bay, Collins Island, 22° 14' 47" S, 150° 19' 08" E, 3 m, 15 September 1993; AMS I.9499 (95.9) Dunk Island, 17° 57' S, 146° 09' E, 1908; AMS IA.6799* (91.3) Lindeman Island, 20° 27' S, 149° 02' E, 1936; AMS IA.6800* (75.9) Lindeman Island, 20° 27' S, 149° 02' E, 1936; AMS IB.2742 (77.1) Moreton Bay, 27° S, 153° E, 1951; AMS IB.5872 (222) Townsville, 19° S, 146° E, 1962; BMNH 1850.7.20.71* (180, skin) Cape York, HMS Rattlesnake; CSIRO C 211† (280 TL) Torres Strait, Bramble Cay, 22 January 1949; CSIRO C 4004 (148) Gulf of Carpentaria, Gulf of Carpentaria, Bentinck Island, 17° 06.2' S, 139° 44.2' E, 12.6 m, 12 August 1963; CSIRO C 4478 (152) Gulf of Carpentaria, Bentnick Island, 16° 55' S, 139° 37' E, 12.5 m, 1 November 1972; CSIRO C 4505 (150) Gulf of Carpentaria, Bentnick Island, 16° 55' S, 139° 37' E, 12.5 m, 1 November 1972; CSIRO CA 774 (87.9) Torres Strait, Thursday or Prince of Wales Islands, 10° 40' S, 142° 15' E, April 1979; CSIRO H 6558-05 (87) Torres Strait, NW of Prince of Wales Island, 10° 31.02' S, 141° 42.30' E, 17 January 2004; CSIRO H 6558-06 (2, 67–69) Torres Strait, NW of Prince of Wales Island, 10° 31.02' S, 141° 42.30' E, 17 January 2004; CSIRO H 6898-08 (54.1) Torres Strait, Prince of Wales Island, 10° 55.24' S, 141° 49.73' E–10° 55.23' S, 141° 49.15' E, 16 m, 14 January 2004; CSIRO H 6900-03 (62) Torres Strait, NE of Banks Island, 9° 52.30' S, 142° 35.43' E, 21 January 2004; QMB I. 82* (~80, holotype of *Torresia lineatea*) Cardwell, 18° 16' S, 146° 1' E; QMB I.5877† (?) Whitsunday Group, Shaw Island, 20° 29' S, 149° 5' E; QMB I.6108 (1) Townsville; QMB I.6110 (1) Dunk Island, 17° 57' S, 146° 9' E; QMB I.6111 (1) Moreton Bay, 27° 15' S, 153° 15' E; QMB I.6112 (1) Moreton Bay, 27° 15' S, 153° 15' E; QMB I.6330 (1) Torres Strait, Yorke Islands, 9° 44' S, 143° 25' E; QMB I.6852† (?) Cape Cleveland, 19° 11' S, 147° 1' E; QMB I.7494† (?)Magnetic Island, Cockle Bay, 19° 11' S, 146° 49' E; QMB I.9909 (1) Queensland coast; QMB I.9910† (?) Queensland coast; QMB I.9911 (1) Queensland coast; QMB I.9912 (1) Queensland coast; QMB I.9913 (1) Queensland coast; QMB I.11824† (?) Moreton Bay, Myora Bight, 27° 28' S, 153° 25' E; QMB I.12212† (?) Moreton Bay, Myora Bight, 27° 28' S, 153° 25' E; QMB I.12554† (?) Moreton Bay, 27° 15' S, 153° 15' E, 23 December 1952; QMB I.15846† (?) 2 miles NW of Nymph Island, 14° 36' S, 145° 14' E, 15 m, 8 February 1979; QMB I.17553† (?) Thursday Island Harbour, 10° 35' S, 142° 13' E, 20 March 1974; QMB I.17554† (?) Torres Strait, Aureed Island, 9° 57' S, 143° 17' E, 17 October 1974; QMB I.17555† (?) Torres Strait, 9° 24' S, 142° 51' E, 7.3 m, 23 March 1974; QMB

I.17556† (?) Torres Strait, 9° 40' S, 142° 33' E, 7.3–13.7 m, 28 March 1974; QMB I.17557† (?) Torres Strait, 10° 21' S, 141° 44' E, 11.9 m, 3 November 1974; QMB I.21140† (?) Weipa Channel, 12° 37' S, 141° 52' E, 17 May 1984; QMB I.22733† (?) Cullen Island, SE of Sarina Beach, 21° 25' S, 149° 30' E, 9 April 1987; QMB I.22784† (?) Sarina Inlet, 21° 24' S, 149° 19' E, 0.5 m, 10 April 1987; QMB I.26697† (?) Torres Strait, Warrior Reefs, 9° 48' S, 142° 58' E, 28 March 1990; QMB I.32523† (?) Pompey Group, Renes Nook, on T line, 21° 17' S, 151° 31' E, 25 m, 13 March 2000; QMB I.33768† (?) ~300 m S of centre of Southern end of Sweers Island, 17° 9' S, 139° 36' E, 2–3.5 m, 15 November 2002; QMB I.34433† (?) rocky reef ca 400 m off SW tip of Sweers Island, 17° 8' S, 139° 36' E, 0.5 m–2 m, 16 November 2002; QMB I.34556† (?) rocky reef ca 800 m off NE side of Sweers Island, 17° 5' S, 139° 39' E, 0.5–3 m, 18 November 2002; QMB I.34628† (?) 150 m off beach at centre of E side of Sweers Island, 17° 7' S, 139° 37' E, 0.3–0.5 m, 23 November 2002; QMB I.34674† (?) SE of Sweers Island, ca 800 m E of Locust Rock, 17° 10' S, 139° 38' E, 0.1–2 m, 24 November 2002; QMB I.34707† (?) E side ofSweers Island, N of Observation Hill, 17° 8' S, 139° 37' E, 0.1–1 m, 19 November 2002; QMB I.35843† (?) 21.43.5' S 150.13.5' E–21° 43' S, 150° 13' E, 32 m, 3 December 2003; USNM 176733* (248) Brisbane. ***Northern Territory***: AMS I.24678-032* (2, 99.8–116) Darwin, East Point, 12° 25' S, 130° 49' E, 1 m, 31 August 1984; AMS IA.1461* (181) Gulf of Carpentaria, Pellew Group, 15° 33' S, 136° 59' E, June 1923; AMS IA.1462* (135) Gulf of Carpentaria, Pellew Group, 15° 33' S, 136° 59' E, June 1923; AMS IA.4388 (78.8) Port Darwin, 12° 27' S, 130° 48' E, 1930; CSIRO CA 2378 (358) Chasm Island, 13° 48' S, 136° 35' E, 26 July 1981; NMV A31441-001 (365) Gulf of Carpentaria, Groote Eylandt, S of North Point Island, 13° 37' S, 136° 41' E, 3–5 m, January 1978; NTM S.10772-003† (105) Darwin, 1978; NTM S.10432-003† (200) Port Essington, Table Head, 11° 13' 01" S, 132° 10' 01" E, 3 July1982; NTM S.16134-027† (138) Bynoe Harbour, Knife Island, 12° 42' 04" S, 130° 35' 31" E, 7 m, 20 April 2002; NTM S.11296-006† (192) East Bremer Islet, 12° 04' 59" S, 136° 52' 01" E, 25 March 1975; NTM S.11408-005† (270) Gove, 21 August 1976; NTM S.11263-017† (2, 127–215) Cobourg Peninsula, Coral Bay, 11° 12' 00" S, 132° 03' 00" E, 18 May 1983; NTM S.11191-002† (357) Peron Island, 13° 10' 01" S, 130° 03' 00" E, 8 April 1983; NTM S.11260-035† (123) Cobourg Peninsula, Coral Bay, 11° 10' 59" S, 132° 03' 00" E, 5 m, 16 May 1983; NTM S.16761-001† (218) Darwin Harbour, Nightcliff, 12° 22' 41" S, 130° 50' 13" E, 4 m, 11 January 1982; NTM S.16776-001† (158) Darwin Harbour, Shoal Bay, 12° 10' 01" S, 130° 58' 59" E, 10 October 1977; NTM S.10979-005† (46) Darwin Harbour, Dudley Point Reef, 12° 12' 14" S, 130° 49' 01" E, 15 November 1982; NTM S.16708-065† (6, 52–100) Darwin Harbour, Vesteys Beach, 12° 26' 10" S, 130° 49' 44" E, 0.3 m, 14 November 2008; NTM S.16989-004† (180) Timor Sea, Bathurst Island, 20° 42' 00" S, 129° 58' 59" E, 30 m, 8 July 1980; USNM 174392* (180) Yirrkala; USNM 174396* (193) Yirrkala; USNM 174402* (300) bay off Yirrkala; USNM 174407* (214) Groote Eylandt. ***Western Australia***: AMS I.13270 (1) Shark Bay, 25° 20' S, 113° 35' E, 1914; CSIRO A 3388 (70.0) Exmouth Gulf, Giralia Bay, 22° 26' S, 114° 21' E, 6 September 1966; CSIRO CA982* (380) Nickol Bay, 20° 20.0' S, 116° 29.0' E–20° 20.0' S, 116° 26.0' E, 46 m, 31 May 1980; CSIRO H 2891-01† (205) Monte Bello Islands, 20° 35.7' S, 115° 49.3' E–20° 35.0' S, 115° 50.3' E, 29 m, 16 September 1991; CSIRO H 4102-04† (1) between Shark Bay & Exmouth Gulf, September 1995; SAM F2985 (167, holotype of *Choerodon rubidus*) Point Samson, 23 July 1957; WAM P.21781-001 (370); WAM P.30320-005 (116) Buccaneer Archipelago, Powerful Island, 16° 05' 00" S, 123° 27' 00" E, 0.1–1 m, 26 August 1991; WAM P.26278-002 (324) 16° 35' S, 121° 31' E, 28–34 m, 29 June 1978; WAM P.31391-022 (21) Beagle Bay, 16° 59' S, 122° 40' E, 9–10 m, 28 August 1997; WAM P.28059-028 (93) 17° 59' S, 122° 11' E, 0–1 m, 28 March 1982; WAM P.31512-018 (106) Dampier Archipelago, Collier Rocks, 20° 25' S, 116° 51' E, 0.1–0.4 m, 24 October 1998; WAM P.24870-001 (3, 236–530) Monte Bello Islands, 20° 26' S, 115° 37' E, May 1973; WAM P.24668-001 (300) Dampier Archipelago, Kendrew Island, 20° 29' S, 116° 32' E, 18 May 1974; WAM P.24774-001 (345) North West Cape, 21° 47' S, 114° 10' E, June 1974; WAM P.4597-001 (265) Houtman Abrolhos, Wallabi Island, 28° 30' S, 113° 50' E.

Choerodon sugillatum. (114 specimens examined, 35.3–149 mm SL). **Australia, *Queensland***: AMS I.15557-206* (116, paratype of *Choerodon sugillatum*) Gulf of Carpentaria, 17° 25' S, 140° 10' E, 10.1 m, 27 November 1963; AMS I.19450-037* (3, 36.2–65.7, paratypes of *Choerodon sugillatum*) Lizard Island, 14° 40' S, 145° 27' E, 15 m, 10 November 1975; AMS I.20751-006* (8, 59.2–97.8, paratypes of *Choerodon sugillatum*) Lizard Island, 14° 38' S, 145° 24' E, 25 m, 8 February 1979; AMS I.20751-044 (5, 77–92) Lizard Island, 14° 38' S, 145° 24' E, 25 m, 8 February 1979; AMS I.20771-066* (2, 87.4–104, paratypes of *Choerodon sugillatum*) Cape York, Captain Billy Creek, 11° 37' S, 142° 56' E, 16–18 m, 18 February 1979; AMS I.20827-007 (81) Cape York, Hannibal Island, 11° 33' S, 142° 57' E, 22–23 m, 15 February 1979; CSIRO C 3462 (114) Gulf of Carpentaria, 16° 32' S, 140° 15' E, 12 September 1963; CSIRO CA 2165 (64.7) Gulf of Carpentaria, Port Musgrave, 11° 18' S, 141° 41' E–11° 18' S, 141° 40' E, 18 m, 8 June 1981; CSIRO H 3303-01 (125) off Shelburne Bay, near Bird Island, 11° 48.7' S, 143° 12.7' E–11° 47.3' S, 143° 11.1' E, 31 m, January 1993; CSIRO H 3442-06 (59.2) E of Cape York Peninsula, 11° 34.2' S, 143° 30.6' E, 40 m, 30 May 1993; CSIRO H 3895-10 (95) Cape Grenville, 11° 37' S, 143° 28' E, 18 m, 21 October 1994; CSIRO H 3897-04 (135) Great Barrier Reef, Pollard Channel, 11° 51.51' S, 143° 27.83' E, 50 m, 17 October 1994; CSIRO H 3897-05 (135) Great Barrier Reef, Pollard Channel, 11° 51.51' S, 143° 27.83' E, 50 m, 17 October 1994; CSIRO H 6151-03 (72.2) Torres Strait, Cape York, 10° 36.82' S, 143° 08.54' E–10° 36.53' S, 143° 09.04' E, 26 m, 9 January 2004; CSIRO H 6519-03 (6, 52.2–96.1) Cooktown, 15° 01.91' S, 145° 29.40' E–15° 02.24' S, 145° 28.91' E, 39 m, 20 November 2003; CSIRO H 7017-02† (96) Gulf of Carpentaria, Mornington Island, 16° 12.92' S, 138° 58.95' E–16° 13.05' S, 139° 00.63' E, 27–28 m, 22 February 2009; NMV A13303 (127) 13 km E of Hannibal Island, 11° 38' 30.00" S, 143° 02' 23.99" E, 22 m, 15 January 1993; NMV A13304 (116) 12 km ESE of Hannibal Island, 11° 37' 54.00" S, 143° 01' 41.99" E, 22 m, 14 January 1993; NMV A13305 (107) 11 km NNE of Cape Grenville, 11° 53' 05.99" S, 143° 16' 12.00" E, 39 m, 13 January 1993; NMV A13306 (2, 115–129) Gulf of Carpentaria, 114 km W of Prince of Wales Island, 10° 50' 35.99" S, 141° 12' 42.00" E, 27 m, 3 February 1993; NMV A13307 (98.8) 18 km W of Saunders Island, 11° 41' 42.00" S, 143° 00' 53.99" E, 18–17 m, 14 January 1993; NMV A2952 (120) Gulf of Carpentaria, 90 km NW of Cullen Point, 11° 19' 12.00" S, 141° 28' 11.99" E, 30 m, 9 September 1982; NMV A2954 (95) Gulf of Carpentaria, 95 km

NW of Prince of Wales Island, 10° 27' S, 141° 15' E, 23 m, 11 September 1982; NMV A2960 (104) Gulf of Carpentaria, 120 km W of Crab Island, 10° 57' S, 141° 02' 41.99" E, 43–44 m, 10 September 1982; NMV A2968 (119) Gulf of Carpentaria, 140 km W of Prince of Wales Island, 10° 39' S, 140° 45' E, 46 m, 13 September 1982; NMV A3126* (104, holotype of *Choerodon sugillatum*) Cape Bedford, 15° 13.59' S, 145° 23.36' E–15° 00' S, 145° 27.87' E, 30 m, 1 March 1983; NMV A3130* (3, 81.2–99.2, paratypes of *Choerodon sugillatum*) Gulf of Carpentaria, Cape York, 10° 50.23' S, 140° 55.11' E–10° 48.01' S, 140° 55.68' E, 44 m, 26 February 1983; NMV A3137* (97.2, paratype of *Choerodon sugillatum*) Cape Tribulation, 16° 09.46' S, 145° 33.23' E–16° 12.17' S, 145° 36.06' E, 30 m, 1 March 1983; NMV A3173 (4, 100–115) Great Barrier Reef, near Haggerstone Island, 12° 03' 16.92" S, 143° 15' 10.08" E, 26–29 m, 27 February 1983; NMV A3178 (120) Gulf of Carpentaria, 155 km W of Cape York, 10° 49' 43.20" S, 141° 08' 32.39" E, 32 m, 26 February 1983; NTM S.13273-016† (4, 49–76) Gulf of Carpentaria, Booby Island, 10° 43' 59" S, 141° 52' 59" E, 10 m, 29 November 1991; NTM S.13277-008† (3, 88–111) Cape York, 11° 21' 00" S, 142° 58' 01" E, 22 m, 1 December 1991; NTM S.13278-011† (2, 100–123) Cape York, 11° 22' 01" S, 142° 55' 01" E, 21 m, 1 December 1991; QMB I.10740† (?) North Palm Island, 18° 33' S, 146° 29' E; QMB I.12398† (?) Cairns, 16° 50' S, 146° E, 27 November 1957; QMB I.15602† (?) Eel Reef, 12° 31' S, 143° 27' E, 30–32 m, 20 February 1979; QMB I.15621† (?) Eel Reef, 12° 22' S, 143° 20' E, 22 m, 20 February 1979; QMB I.15626† (?) Nymph Island, 14° 36' S, 145° 14' E, 15 m, 8 February 1979; QMB I.15674† (?) Lizard Island, 15° 30' S, 145° 22' E, 20 m, 8 February 1979; QMB I.15698† (?) Nymph Island, 14° 33' S, 145° 6' E, 16 m, 8 February 1979; QMB I.16164† (?) Hannibal Island, 11° 33' S, 142° 57' E, 21.9 m, 15 February 1979; QMB I.16214† (?) Lizard Island, 14° 38' S, 145° 24' E, 25.6 m, 8 February 1979; QMB I.17566† (?) Torres Strait, Aureed Island, 9° 57' S, 143° 17' E, 27 November 1974; QMB I.17567† (?) Torres Strait, P D Sand Cay, 10° 11' S, 143° 14' E, 18 October 1974; QMB I.17568† (?)Torres Strait, Aeroplane Sandbank, 10° 20' S, 143° 15' E, 18.3–25.6 m, 19 October 1974; QMB I.17569† (?) Torres Strait, Caldbeck Reef, 10° 10' S, 143° 13' E, 5 December 1974; QMB I.17570† (?) Torres Strait, 9° 44' S, 142° 51' E, 31 March 1974; QMB I.17571† (?) Torres Strait, 9° 49' S, 142° 48' E, 12.8–17.4 m, 4 April 1974; QMB I.17572† (?) Torres Strait, 9° 53' S, 142° 50' E, 6 April 1974; QMB I.17573† (?) Torres Strait, 9° 58' S, 142° 41' E, 14.6–16.5 m, 8 April 1974; QMB I.17574† (?) Torres Strait, 10° 4' S, 142° 43' E, 25 April 1974; QMB I.18098† (?) Princess Charlotte Bay, 14° 5' S, 144° 4' E, 25.6 m, 19 September 1979; QMB I.18212† (?) Lizard Island, 14° 20' S, 145° 51' E, 23.8 m, 18 September 1979; QMB I.18502† (?) Green Island, 16° 46' S, 145° 58' E, 40 m, 9 October 1980; QMB I.19608† (?) Flora Passage, 17° 1' S, 146° 20' E, 49.4 m, 9 October 1979; QMB I.19655† (?) Flora Passage, 17° 8' S, 146° 15' E, 43.9 m, 16 October 1979; QMB I.19690† (?) Palm Islands, 18° 35' S, 146° 49' E, 45.7 m, 16 October 1979; QMB I.20322† (?) Sudbury Reef, 17° 3' S, 146° 7' E, 33–36 m, 3 June 1905; QMB I.20474† (?) Cairns, 17° S, 146° 3' E, 30 m, 25 April 1982; QMB I.20494† (?) Cairns, 17° S, 146° E, 25 April 1982; QMB I.23061† (?) Swain Reefs, 21° S, 151° E, 62 m, 17 September 1986; QMB I.23517† (?) Cape Bowling Green, 19° S, 147° 25' E, 41 m, 8 May 1985; QMB I.26151† (?) Capricorn Group, 23° 30' S, 152° E, 36.5–54.8 m, 2 August 1957; QMB I.26226† (?) Cairns, 16° 50' S, 146° E, 27 November 1957; QMB I.27727† (?) Gulf of Carpentaria, 10° 30' S, 141° 9' E, 23 m, 3 December 1990; QMB I.27964† (?) Gulf of Carpentaria, 15° 57' S, 138° 41' E, 25 m, 11 December 1990; QMB I.30052† (?) Gulf of Carpentaria, 15° 32' S, 139° 42' E, 45 m, 7 December 1990; QMB I.34382† (?) McCulloch Reef, 17° 16' S, 146° 25' E, 28 September 2003; QMB I.34854† (?) Gulf of Carpentaria, 12° 56' S, 141° 9' E, 36 m, 26 November 1991; QMB I.34860† (?) Gulf of Carpentaria, 11° 19' S, 140° 56' E, 41 m, 27 November 1991; QMB I.35033† (?) 17° 57.3' S, 146° 25.5' E, 27 September 2003; QMB I.35146† (?) 14° 42.3' S, 145° 26.1' E, 5 October 2003; QMB I.35332† (?) 19° 5.1' S, 147° 23.7' E, 21 September 2003; QMB I.35375† (?) 19° 2.7' S, 147° 23.7' E, 21 September 2003; QMB I.35544† (?) 18° 38.1' S, 147° 16.5' E, 18 September 2004; QMB I.35611† (?) 18° 58.5' S, 146° 56.1' E, 18 September 2003; QMB I.36216† (?) 17° 29.7' S, 146° 15.9' E, 29 m, 28 April 2004; QMB I.36287† (?) 20° 20.7' S, 150° 23.1' E, 20 m, 11 May 2004; QMB I.36943† (?) Cape York, E of Furze Point, 11° 4' S, 142° 52' E, 21 m, 30 November 1991; QMB I.37421† (?) 13° 43.5' S, 144° 7.5' E, 35 m, 18 January 2005; USNM 280628* (4, 64.2–84.0) same collection data as AMS I.20751-006; ***Northern Territory:*** NTM S.12942-007† (136) Arafura Sea, 11° 22' 01" S, 134° 07' 01" E, 22 October 1990; NTM S.12933-002† (2, 76–83) Arafura Sea, 10° 24' 00" S, 129° 34' 01" E, 91 m, 17 November 1990; ***Western Australia:*** AMS I.22802-008 (4, 104–123) North West Shelf, Port Hedland, 19° 39' S, 117° 53' E, 52–53 m, 26 March 1982; CSIRO B 4020 (45.2) North West Shelf, Port Hedland, 19° 54.9' S, 118° 00.8' E–19° 54.7' S, 118° 00.5' E, 37–38 m, 5 December 1982; CSIRO CA 2164 (85.8) Nickol Bay, 19° 50.0' S, 116° 28.0' E–19° 52.0' S, 116° 27.0' E, 68–70 m, 4 December 1979; CSIRO CA 2166 (118) Joseph Bonaparte Gulf, 11° 01.0' S, 128° 37.0' E–11° 01.0' S, 128° 35.0' E, 30 m, 10 July 1980; CSIRO CA 2167 (99.5) Monte Bello Islands, 20° 04.0' S, 116° 18.0' E–20° 02.0' S, 116° 20.0' E, 56–58 m, 31 May 1980; CSIRO CA 2168 (90.3) Ashmore Reef, NW of Admiralty Gulf, 12° 27' S, 124° 27' E–12° 27 S, 124° 25' E, 76–78 m, 16 July 1980; CSIRO CA 2323 (67.6) Admiralty Gulf, 13° 23' S, 124° 48' E–13° 25' S, 124° 51' E, 120 m, 29 March 1981; CSIRO CA 2324 (86.7) Admiralty Gulf, 13° 23' S, 124° 48' E–13° 25' S, 124° 51' E, 120 m, 29 March 1981; CSIRO CA 2325 (92.9) Admiralty Gulf, 13° 23' S, 124° 48' E–13° 25' S, 124° 51' E, 120 m, 29 March 1981; CSIRO CA 3058 (126) Port Hedland, 20° 02.6' S, 117° 53.6' E–20° 01.2' S, 117° 53.6' E, 34–36 m, 17 October 1982; CSIRO H 648-01 (96.1) Monte Bello Islands, 20° 00.0' S, 115° 58.0' E–20° 03.0' S, 115° 57.0' E, 78–80 m, 2 December 1979; CSIRO H 656-01* (141, paratype of *Choerodon sugillatum*) Dampier Archipelago, Cape Preston, 20° 48.0' S, 116° 00.0' E–20° 46.0' S, 115° 59.0' E, 19–22 m, 1 December 1979; CSIRO H 657-01* (35.3, paratype of *Choerodon sugillatum*) Monte Bello Islands, 20° 00.0' S, 115° 58.0' E–20° 03.0' S, 115° 57.0' E, 78–80 m, 2 December 1979; CSIRO H 657-02* (50.6, paratype of *Choerodon sugillatum*) Monte Bello Islands, 20° 00.0' S, 115° 58.0' E–20° 03.0' S, 115° 57.0' E, 78–80 m, 2 December 1979; CSIRO H 658-01* (96.1, paratype of *Choerodon sugillatum*) Dampier Archipelago, 19° 47' S, 116° 33' E–19° 45' S, 116° 35' E, 64–60 m, 4 December 1979; CSIRO H 2188-02 (9, 37–113) North West Shelf, Port Hedland, 19° 29.7' S, 118° 52.0' E–19° 29.4' S, 118° 52.5' E, 39 m, 25 October 1983; CSIRO H 4351-01 (2, 75–110) Port Hedland, 19° 58.5' S, 117° 49.0' E–19° 58.1' S, 117° 49.5' E, 42 m, 26 June 1983; NMV A1876* (3, 124–133) North West Shelf, NW of Dampier, 20° 10' 12.00" S, 116° 04' 11.99" E, 60 m, 9 March 1981; NMV

A1926 (14, 75–125) North West Shelf, NW of Dampier, 20° 07' 12.00" S, 116° 12' E, 60 m, 9 March 1981; NMV A1938 (140) North West Shelf, NW of Dampier, 20° 10' 47.99" S, 116° 09' E, 57–58 m, 9 March 1981; NMV A1939 (3, 100–110) North West Shelf, NNE of Cape Lambert, 19° 31' 11.99" S, 117° 17' 59.99" E, 73 m, 10 March 1981; NTM S.13974-010† (130) Dampier Archipelago, 20° 13' 01" S, 116° 17' 60" E, 11 May 1983; NTM S.14363-014† (2, 60–69) Holothuria Banks, Bassett Smith Shoal, 13° 13' 08" S, 125° 14' 53" E, 63 m, 12 June 1996; NTM S.11672-003† (112) North West Shelf, Rowley Shoals, 19° 01' 59" S, 118° 30' 00" E, 86 m, 2 June 1985; NTM S.11580-010† (103) Dampier Archipelago, 20° 03' 00" S, 115° 47' 60" E, 53 m, 8 May 1983; NTM S.11554-019† (109) Dampier Archipelago, 20° 03' 00" S, 115° 47' 60" E, 7 May 1982; NTM S.11673-001† (84) North West Shelf, Rowley Shoals, 19° 12' 00" S, 118° 40' 59" E, 80 m, 1 June 1985; NTM S.11690-007† (2, 76–116) North West Shelf, King Sound, 16° 33' 00" S, 121° 28' 59" E, 46 m, 17 April 1985; NTM S.11582-008† (99) 19° 48' 00" S, 116° 34' 59" E, 73 m, 19 May 1983; NTM S.16718-005† (126) North West Shelf, Bedout Island, 19° 04' 01" S, 119° 27' 00" E, 75 m, 25 May 1983; WAM P.25354-023* (6, 133–145, paratypes of *Choerodon sugillatum*) Monte Bello Islands, 20° 25' S, 115° 30' E, April 1975.

Choerodon typus. (45 specimens examined, 38.6–123 mm SL). **INDIAN OCEAN, India**: BPBM 20506 (3, 75–100) Madras; BPBM 20654 (77.1) Madras-Tuticorin. **Andaman Islands**: USNM 218485* (2, 78.2–79.5) 12° 03' N, 92° 57' E, 37 m. **Thailand**: CAS 204373 (1) Gulf of Thailand, SE of Goh Chuang, 12° 11' N, 100° 35' E, 25 m, 14–19 December 1960; CAS 204380 (2) Gulf of Thailand, SSE of Goh Chuang, 12° 06' N, 101° 11' E, 12 m, 28 December–2 January 1961; NSMT-P 55232* (93.9) Gulf of Thailand, Songkhla, 18 November 1986; USNM 218491* (11, 65.8–94.2) 09° 13' N, 97° 51' E, 58 m. **PACIFIC OCEAN, China**: USNM 219452* (38.6) South China Sea, Macclesfield Bank, 15° 49.4' N, 114° 31.8' E–15° 58.8' N, 114° 33.8' E. **Taiwan**: THUP 03367 (73.0) Koahsiung. **Palau**: CAS 204374 (1) Tapraki Reef, 7° 16' 7" N, 134° 27' 31" E, 0–3 m, 15 April 1959. **Vietnam**: MNHN 1963-604* (82.4); MNHN 1964-632* (2, 104–110) South Vietnam. **Singapore**: BMNH 1884.8.14.10 (97.3) Dobson; CAS 29237 (1) 1.358430° N, 103.803433° E. **Philippines**: USNM 153279* (51.6) Palawan, Cuvayan Island; USNM 153280* (61.7) Corregidor Light; USNM 153281* (59.6) Palawan, Observatory Island; USNM 153282* (62.8) Luzon, Sueste Point; USNM 347101 (115) Iloilo, Panay Island; USNM 260873* (2, 95.4–96.5) Visayan Sea between northern Negros and Masbate, 11° 35' 45" N, 123° 55' 32" E, 78.7 m, 6 June 1978; USNM 260875* (123) Visayan Sea between northern Negros and Masbate, 11° 38' 20" N, 123° 58' 38" E, 80.5 m, 5 June 1978; USNM 347101* (2, 123–123) Iloilo Strait between Penay and Guimaris Islands; USNM 408907* (104) Luzon, Sorsogon, Bulan. **Indonesia**: BMNH 1864.5.15.35* (102, holotype of *Xiphocheilos typus*) Nias; BMNH 1879.5.14.34* (87.4, holotype of *Xiphochilus quadrimaculatus*) Arafura Sea; USNM 153979* (59.0) Sulawesi, Makasser Island. **Australia, *Queensland***: CSIRO H 7379-02 (95.5) 16.5347° S, 146.0336° E, 54.2 m, 22 November 2003; CSIRO H 6647-03 (93.3) Northern Great Barrier Reef, N of Princess Charlotte Bay, 13.57° S, 144.03° E, 40 m, 5 October 2004; NMV A2949 (110) Gulf of Carpentaria, 105 km WNW of Cullen Point, 11° 25' 11.99" S, 141° 01' 48.00" E, 45 m, 8 September 1982; NMV A13302 (105) Gulf of Carpentaria, 11° 55' 05.99" S, 139° 56' 41.99" E, 59 m, 6 February 1993.

Choerodon venustus. (56 specimens examined, 48–384 mm SL). **Australia**: ANSP 82300 (1); USNM 176703* (304) Great Barrier Reef area near Brisbane, 8–29 May1952. ***New South Wales***: AMS I.25663-008 (89) Yamba, 29° 31' S, 153° 28' E–29° 34' S, 153° 25' E, 49–53 m, 24 March 1985; AMS I.25663-019* (52) same collection data as AMS I.25663-008; AMS I.25665-010* (2, 64.2-73.4) Yamba, 29° 21' S, 153° 29' E, 49–51 m, 21 March 1985; AMS I.25665-034 (2, 63–71) same collection data as AMS I.25665-010; AMS I.26022-002* (85) off Woody Head, 29° 21' S, 153° 27' E–29° 21' S, 153° 31' E, 44–53, 23 March 1985; AMS I.26534-010 (2, 48–57) Iluka, 29° 22' S, 153° 27' E–29° 14' S, 153° 32' E, 46–57 m, 23 May 1986; AMS I.27659-003* (78.4) Yamba, 29° 16' S, 153° 29' E–29° 16' S, 153° 32' E, 43–53 m, 23 March 1985; AMS IB.2616 (1) Newcastle, 32° 56' S, 151° 46' E, 1951; NMV A22004 (30.7) Port Jackson, 33° 51' 00.00" S, 151° 16' 12.00" E, 20 m, 8 May 1982. ***Queensland***: AMS E.1472 (1) Double Island Point, 26° 25' S, 153° 30' E, 60 m, 28 June 1910; AMS E.1473 (144, syntype of *Choerodon ambiguus*) same collection data as AMS E.1472; AMS E.1474 (1) same collection data as AMS E.1472; AMS E.1475 (1) same collection data as AMS E.1472; AMS E.1476 (198) same collection data as AMS E.1472; AMS E.1528† (133) Wide Bay, 25° 52' S, 153° 07' E, 1909; AMS E.1529* (154) same collection data as AMS E.1528; AMS E.2873–4* (10, 95.8–133) Double Island Point, 26° 08' S, 153° 25' E, 60 m, 2 December 1910; AMS I.10935† (172) Double Island Point, 26° 00' S, 153° 00' E, 28 June 1910; AMS I.10936 (225) same collection data as AMS I.10935; AMS I.10991 (155) Wide Bay, 25° 52' S, 153° 07' E, 1910; AMS I.11007 (384) Double Island, 26° 00' S, 153° 00' E, 53 m, 29 June 1910; AMS I.12535* (134, syntype of *Choerodon ambiguus*) Double Island Point, 25° 56' S, 153° 11' E, 1909; AMS I.15625-035 (190) One Tree Island, 23° 30' S, 152° 05' E, 32 m, 8 December 1966; AMS I.15637-040 (222) One Tree Island, 23° 30' S, 152° 05' E, 23–26 m, 5 October 1967; AMS I.15684-038* (213) One Tree Island, 23° 30' S, 152° 05' E, 32–29 m, 1 December 1969; AMS I.22002-002 (240) One Tree Island, 23° 30' S, 152° 05' E, 47–67 m, 8 December 1966; AMS I.24089-002* (219) Heron Island, 23° 27' S, 151° 55' E, 3 December 1977; AMS IA.2072 (335) Great Barrier Reef, Great Palm Island, 18° 45' S, 146° 37' E, July 1924; BPBM 14507 (70) One Tree Island, 19 January 1973; BPBM 15972 (241) Heron Island, 30 June 1973; BPBM 14507* (66.3) Heron Island; BPBM 15972 (2, 197–241) Heron Island; CSIRO H 4307-13* (355) 31 July 1996; CSIRO H 6913-01† (240) Gladstone, 23° 22.29' S, 151° 58.34' E, 23° 22.51' S, 151° 58.86' E, 44 m, 22 April 2004; CSIRO H 6697-03* (138) 19.2638° S, 148.141° E, 59.3 m, 12 December 2003; CSIRO H 6748-05* (132) SE of Bunker Group, 23° 58.71' S, 152° 37.79' E, 54 m, 15 April 2004; CSIROH 6152-03* (4, 53.3–192) 21.5096° S, 151.4815° E, 60 m, 7 December 2003; MCZ 36810 (245) Gladstone; QMB I.4735* (234, holotype of *Choerops venustus*) Moreton Bay; I.4736 (1) Moreton Bay; QMB I.9457 (1) Heron Island; QMB I.11411 (1) Heron Island; QMB I.535† (?) Flat Top; QMB I.673† (?) Moreton Bay, 27° 15' S, 153° 15' E; QMB I.703† (?) Moreton Bay, 27° 15' S, 153° 15' E; QMB I.718† (?) Cape Moreton, 27° 2' S, 153° 28' E; QMB I.750† (?) Moreton Bay, 27° 15' S, 153° 15' E; QMB I.751† (?) Masthead Island, Capricorn Group, 23° 32' S, 151° 44' E; QMB I.1543† (?) Double Island Point, 25° 56' S, 153° 11' E, 60.3 m; QMB I.2114† (?) Moreton Bay, 27° 15' S, 153°

15' E; QMB I.2984† (?) Moreton Bay, 27° 15' S, 153° 15' E; QMB I.3068† (?) Moreton Bay, 27° 15' S, 153° 15' E; QMB I.3069† (?) Moreton Bay, 27° 15' S, 153° 15' E; QMB I.3201† (?) Moreton Bay, Myora, 27° 28' S, 153° 25' E; QMB I.4735† (?) Moreton Bay, 27° 15' S, 153° 15' E; QMB I.4736† (?)Moreton Bay, Snapper Banks; QMB I.5404† (?) Kelso Reef, 18° 24' S, 147° E; QMB I.5415† (?) Townsville, Lodestone Reef, 18° 41' S, 147° 5' E; QMB I.5529† (?) Heron Island, 23° 27' S, 151° 55' E; QMB I.5536† (?) Heron Island, 23° 27' S, 151° 55' E; QMB I.5537† (?); QMB I.5544† (?) off Townsville, Lodestone Reef, 18° 41' S, 147° 5' E; QMB I.6096† (?) Palm Island, 18° 40' S, 146° 33' E; QMB I.6607† (?)Fraser Island, N Gardiner Bank, 25° S, 153° 25' E; QMB I.6992† (?) Keeper Reef, 18° 45' S, 147° 16' E; QMB I.9457† (?) Heron Island, 23° 27' S, 151° 55' E; QMB I.11411† (?) Heron Island, 23° 27' S, 151° 55' E; QMB I.13771† (?) Noosa Heads, 26° 23' S, 153° 7' E, 1 January 1977; QMB I.16612† (?) Mooloolaba, 26° 41' S, 153° 16' E, 27.4–36.6 m, 2 July 1979; QMB I.16613† (?) Mooloolaba, 26° 41' S, 153° 16' E, 27.4–36.6 m, 2 July 1979; QMB I.19312† (?) Brisbane, 5 February 1982; QMB I.21311† (?) Capricorn Group, 23° 30' S, 152° E, 29 July 1980; QMB I.21331† (?) Masthead Island, 23° 30' S, 151° 44' E, 2 March 1982; QMB I.21385† (?) Brisbane, 1 November 1984; QMB I.23045† (?) Swain Reefs, 21° 16' S, 151° 10' E, 33 m, 14 September 1986; QMB I.23046† (?) Swain Reefs, 21° 13' S, 150° 43' E, 47 m, 16 September 1986; QMB I.25362† (?) Brisbane, 20 July 1988; QMB I.26511† (?) Brisbane, 1 January 1990; QMB I.32731† (?) Llewellyn Reef, 23° 45' S, 152° 9' E, 47 m, 3 October 2000; QMB I.34083† (?) Capricorn Group, 23° 2' S, 151° 26' E, 40 m, 3 October 2000; QMB I.36123† (?) 21° 30.9' S, 151° 28.5' E, 60 m, 25 May 2004; QMB I.37869† (?) 19° 51.9' S, 149° 10.5' E, 60 m, 27 November 2005; QMB I.40027† (?) 23° 2.7' S, 151° 5.1' E, 30 m, 3 November 2005.

Choerodon vitta. (40 specimens examined, 29.5–174 mm SL). **Indonesia**: AMS I.12534* (141, paralectotype of *Choerodon vitta*) Aru Islands, Dobo, 1912; QMB I.1555* (148, lectotype of *Choerodon vitta*) Aru Islands, Dobo. **Australia, *Queensland***: AMS I.15557-201* (3, 101–144) Gulf of Carpentaria, 17° 25' S, 140° 10' E, 10.1 m, 27 November 1963; AMS I.15557-202* (82.1) Gulf of Carpentaria, 17° 25' S, 140° 10' E, 10.1 m, 27 November 1963; AMS I.18767-009 (4, 29.5–47.1) Great Barrier Reef, Linnet Reef, 14° 47' S, 145° 20' E, 6–15 m, 22 November 1975; AMS I.19461-034* (2, 63.9–68.7) Decapolis Reef, 14° 51' S, 145° 17' E, 2–4 m, 14 November 1975; AMS I.20825-002* (174) Decapolis Reef, 14° 51' S, 145° 16' E, 3 December 1978; CSIRO C 4010 (147) Gulf of Carpentaria, 17° 06' S, 139° 44' E, 12 August 1963; CSIRO C 4481 (127) Gulf of Carpentaria, Bentnick Island, 16° 55' S, 139° 37' E, 12.5 m, 1 November 1972; CSIRO H 6558-04 (107) Torres Strait, NW of Prince of Wales Island, 10° 31.02' S, 141° 42.30' E, 17 January 2004; CSIRO H 6904-03* (120) Torres Strait, Newcastle Bay, 10° 28.80' S, 142° 52.44' E–10° 28.95' S, 142° 52.48' E, 19 m, 12 January 2004; CSIRO H 6904-05* (109) same collection data as CSIRO H 6904-03; CSIRO H 7996-01* (2, 97.1–127) Torres Strait, Endeavour Strait, 10° 46.58' S, 142° 15.24' E, 16 m, 19 January 2004; CSIRO H 7897-01* (78.9) 10.1067° S, 142.9177° E, 19.7 m, 12 January 2004; NMV A3181 (145) Gulf of Carpentaria, 155 km W of Cape York, 10° 49' 43.20" S, 141° 08' 32.39" E, 32 m, 26 February 1983; NMV A 31435-001* (103) N of Margaret Bay, 11° 54.34' S, 143° 16.54' E, 49 m, 30 September 2004; QMB I.1331 (117) Southport, 27° 58' S, 153° 25' E; QMB I. 11331† (?) N of Townsville, Paluma Shoals, 19° 6' S 146° 33' E; QMB I. 11375† (?) Palm Island, 18° 40' S 146° 33' E; QMB I. 15241† (?) Torres Strait, 9° 40' S 142° 33' E, 7.3–8.2 m, 28 March 1974; QMB I. 17558† (?) Torres Strait, 10° 2' S 142° 37' E, 17 m, 21 April 1974; QMB I. 17559† (?) Torres Strait, 10° 2' S 142° 44' E, 8.5 m, 20 April 1974; QMB I. 17560† (?) Torres Strait, 9° 52' S 142° 32' E, 13 m, 22 April 1974; QMB I. 17561† (?) Torres Strait, 10° 4' S 142° 31' E, 14 m, 25 April 1974; QMB I. 17562† (?) Torres Strait, 10° 7' S 142° 41' E, 26 April 1974; QMB I. 17563† (?) Torres Strait, 10° 12' S 142° 39' E, 18 m, 2 May 1974; QMB I. 17564† (?) Torres Strait, 9° 52' S 141° 33' E, 12.8–14.6 m, 30 May 1974; QMB I. 17565† (?) Torres Strait, 9° 56' S 141° 41' E, 11.9 m, 1 June 1974; QMB I. 18168† (?) Eel Reef, 12° 26' S 143° 19' E, 18.3 m, 24 September 1979; QMB I. 20102† (?) Frankland Islands, 17° 11' S 146° 4' E, 6–10 m, 1 November 1982; QMB I. 23538† (?) Cape Bowling Green, 19° 17' S 147° 21' E, 18 m, 19 February 1985; QMB I. 34896† (?) Gulf of Carpentaria, 10° 38' S 141° 27' E, 15 m, 29 November 1991; QMB I. 36202† (?) 22° 3.3' S 150° 21.3' E, 28 m, 10 May 2004; QMB I. 38944† (?) Gloucester Passage, 20° 3' 11" S 148° 25' 38" E, 9 m, 20 September 2011; ***Northern Territory:*** NTM S.11283-004† (41) Darwin Harbour, Dudley Point, 12° 25' 01" S, 130° 48' 00" E, 23 May 1984; NTM S.11274-009† (79) English Company Islands, Cotton Island, 11° 48' 00" S, 136° 30' 00" E, 11 m, 21 February 1984; NTM S.10696-010† (5, 58–150) Darwin Harbour, East Point, 12° 24' 00" S, 130° 49' 01" E, 13 September 1982; NTM S.13257-003† (157) Gulf of Carpentaria, Cape Grey, 13° 03' S, 136° 45' E, 22 m, 23 November 1991; NTM S.12961-002† (136) Arafura Sea, 11° 22' 59" S, 136° 05' 60" E, 34 m, 26 October 1990; NTM S.13311-005† (3, 104–141) Timor Sea, North Anson Bay, 12° 58' 01" S, 129° 54' 00" E, 18 m, 21 November 1990; NTM S.11252-001† (158) Cobourg Peninsula, Table Head, 11° 15' 00" S, 132° 10' 01" E, 7 m, 12 May 1983; NTM S.13236-020† (20) Marchinbar Island, Sphinx Head Bay, 11° 16' 01" S, 136° 40' 59" E, 16 November 1990; NTM S.17174-001† (3, 68–87) Darwin Harbour, East Point Reef, 12° 24' 47" S, 130° 48' 36" E, 22 November 1982; NTM S.13436-002† (15) Flat Top Bank, 12° 16' 48" S, 129° 13' 59" E, 17 May 1992; ***Western Australia:*** AMS I.21630-002* (146) Timor Sea, 11° 02' S, 128° 48' E, 30 m, 26 June 1979; AMS I.22802-007† (142) North West Shelf, Port Hedland, 19° 39' S, 117° 53' E, 52–53 m, 26 March 1982; AMS I.22806-010 (2, 132–135) North West Shelf, Port Hedland, 19° 29' S, 118° 22' E, 54–60 m, 29 March 1982; AMS I.22831-028* (8, 95.2–172) North West Shelf, Port Hedland, 20° 00' S, 117° 16' E, 50 m, 16 April 1982; CSIRO CA 233 (134) Dampier Archipelago, 20° 35' S, 116° 14' E–20° 35' S, 116° 17' E, 32–34 m, 14 May 1978; CSIRO CA 1492 (124) Roebuck Bay, 17° 50.0' S, 121° 46.0' E–17° 51.0' S, 121° 42.0' E, 52–58 m, 8 November 1980; CSIRO CA 2162 (152) Forestier Island, 19° 53.0' S, 118° 13.0' E–19° 52.0' S, 118° 12.0' E, 37–36 m, 3 June 1980; CSIRO CA 2163 (147) Eighty Mile Beach, 19° 27' S, 120° 21' E–19° 29' S, 120° 23' E, 35–31 m, 7 June 1980; NMV A1874 (167) North West Shelf, NW of Dampier, 20° 10' 12.00" S, 116° 04' 11.99" E, 60 m, 9 March 1981; NTM S.10726-001† (170) Cootamundra Shoals, 10° 49' 59" S, 129° 13' 01" E, 14 May 1982; NTM S.11688-007† (144) North West Shelf, King Sound, 16° 31' 59" S, 121° 25' 59" E, 42 m, 17 April 1985; NTM S.11690-012† (2, 124–159) North West Shelf, King Sound, 16° 33' 00" S, 121° 28' 59" E, 46 m, 17 April 1985; NTM S.14362-014† (80) Holothuria Banks, West Holothuria Reef, 13° 25' 12" S, 125° 39' 18" E, 50 m, 12 June 1996; NTM S.16718-

008† (172) North West Shelf, Bedout Island, 19° 04' 01" S, 119° 27' 00" E, 75 m, 25 May 1983; WAM P.31391-012† (63) Beagle Bay, 16° 59' S, 122° 40' E, 9–10 m, 28 September 1997; WAM P.25397-019† (6, 97–139) Rowley Shoals, 17° 29' S, 121° 52' E, 0–42 m, 21 December 1969; WAM P.31894-001† (55) Dampier Archipelago, Rosemary Island, Tish Point, 20° 29.94' S, 116° 38.11' E, 12–15 m, 26 July 1999; WAM P.31884-002† (39) Dampier Archipelago, Enderby Island, 20° 40.93' S, 116° 33.21' E, 9–9.2 m, 23 July 1999; WAM P.32707-001† (2, 76–82) Exmouth Gulf, Bundegi Reef, 21° 51.281' S, 114° 12.056' 0" E, 21.4–21.2 m, 8 July 2004; WAM P.32667-003† (120) Exmouth Gulf, Bundegi Reef, 21° 51.815' S, 114° 11.902' 0" E, 22.4–22.6, 16 March 2004; WAM P.4550-001† (116) Exmouth Gulf, 22° 05' S, 114° 15' E, 18 September 1958; WAM P.4553-001† (114) Exmouth Gulf, 22° 05' S, 114° 15' E, 5 October 1958; WAM P.4583-001† (?) Exmouth Gulf, 22° 05' S, 114° 15' E, 5 October 1958; WAM P.5694-001† (?) Exmouth Gulf, 22° 05' S, 114° 15' E; WAM P.25095-050† (126) Exmouth Gulf, 22° 05' S, 114° 15' E, 0–12 m, October 1974.

Choerodon zamboangae. (36 specimens examined, 95.6–249 mm SL). **Japan,** ***Okinawa***: BPBM 19167 (222) Naha; SMBL-F 73324 (216) Naha, 100 m, 6 August 1973; SMBL-F 73325 (231) same collection data as SMBL-F 73324. **Taiwan**: THUP 00956* (213); THUP 02069* (164); THUP 02492* (210). **Philippines**: AMS I.31430.040† (1) Dumaguete, 09° 20' N, 123° 18' E, 16 April 1986; AMS I.31430-010† (220) Dumaguete, 09° 20' N, 123° 18' E, 16 April 1986; AMS I.40105-011† (1) Lighthouse Point, North Mindoro Island on Escarceo Point, 13° 31' 05" N, 120° 59' 33" E, 5–20 m, 15 May 2000; BMNH 1933.3.11.497 (163) Sulu, Jolo, Herre; CAS 32364 (3, 130–162) Sulu Archipelago, Jolo, 5.925203° N, 121.153284° E–5.925203° N, 121.153284° E, 30 December 1936; CAS 38731 (188) 6 miles NE of Zamboanga, 5 September 1940; USNM 557*8 (95.6, paratype of *Choerodon melanostigma*) Jolo, 11 February 1908; USNM 5579* (164, paratype of *Choerodon melanostigma*) same collection data as USNM 5578; USNM 57846* (226, holotype of *Choerodon zamboangae*) Zamboanga, Mindinao, August 1906; USNM 61154* (203, paratype of *Choerodon zamboangae*) Zamboanga, Mindinao, August 1906; USNM 89967* (171, holotype of *Choerodon melanostigma*) Jolo; USNM 152164* (217) Zamboanga; USNM 152165* (2, 190–196) Zamboanga; USNM 153475* (204) Zamboanga; USNM 153476* (203) Zamboanga. **Indonesia**: BPBM 2994 (1) Lombok; BPBM 29944* (2, 131–157) Lombok, 11 February 1984; CSIRO H 7988-01* (133) Kedonganan, 8° 45' S, 115° 10' E, 24 February 2009; CSIRO H 7219-06* (130) Lombok, Tanjung Luar, 8° 48' S, 116° 29' E, 4 November 2010; CSIRO H 7219-07* (166) same collection data as CSIRO H 7219-06; MZB 23117* (137) Lombok, Tanjung Luar, 8° 48' S, 116° 29' E, 4 August 2010; NMV A 31432-001* (157) Lombok, Tanjung Luar, 8° 48' S, 116° 2' E, 26 February 2011; WAM P.32927-002 (109) Raja Ampat Islands, Misool Island, 02° 13' S, 130° 33' E, 65–75 m, 13 November 2007; NTM S.10752-001† (165) South Lombok, 09° 01' 01" S, 116° 17' 60" E, September 1981; NTM S.10753-001† (183) 1981; NTM S.10752-014† (189) South Lombok, 09° 01' 01" S, 116° 17' 60" E, September 1981**Timor-Leste**: AMS I.46112.050† (1) Dili, 08° 32' 53" S, 125° 35' 15" E, 18 September 2012; AMS I.46112-049† (190) Dili, 08° 32' 53" S, 125° 35' 15" E, 18 September 2012. **Australia**, ***Northern Territory:*** AMS I. 37179-001* (136) Timor Sea, 10° 07' 49" S, 129° 19' 55" E, 86 m, 2 October 1995; AMS I.37184-001† (210) Arafura Sea, 09° 58' 44" S, 129° 18' 15" E, 82.3 m, 1 October 1995; AMS I.37184-004† (230) Arafura Sea, 09° 58' 44" S, 129° 18' 15" E, 82.3 m, 1 October 1995; NTM S.14000-001 (215) Arafura Sea, "Tassie Shoal", 10° 16' 48" S, 129° 38' 06" E, 88 m, 15 March 1995; NTM S.15129-002† (236) Arafura Sea, Evans Shoal, 10° 02' 49" S, 129° 29' 13" E, 107 m, 15 January 2000; NTM S.15224-001† (2, 222–243) Arafura Sea, Evans Shoal, 10° 09' 47" S, 129° 43' 55" E, 88 m, 29 March 1995; NTM S.13728-003† (240) Arafura Sea, Lynedoch Bank, 10° 10' 59" S, 130° 40' 01" E, 102 m, 28 August 1993. ***Western Australia:*** AMS I.22804-017* (244) North West Shelf, Port Hedland, 18° 57' S, 118° 12' E, 100–104 m, 27 March 1982; CSIRO CA 2161 (194) Joseph Bonaparte Gulf, 9° 52.0' S, 129° 12.0' E–9° 52.0' S, 129° 14.0' E, 138–158 m, 9 July 1980; NMV A 29706-001 (244) north Western Australia, 15° 06' 31" S–15° 04' 50" S, 121° 46' 11" E–121° 48' 23" E, 90–96 m, 28 June 2007; WAM P.26251-004* (153) Cape Villaret, 16° 03' S, 120° 58' E, 98–100 m, 25 June 1978; WAM P.26277-003 (143) 18° 53' S, 118° 35' E, 105 m, 29 May 1978; WAM P.25927-007 (249) Rankin Bank, 19° 40' S, 115° 45' E, 128 m, 25 August 1977; WAM P.31532-001 (235) Heywood Shoal, 13° 25.53' S, 124° 05.81' E, 94 m, 31 July 1998; WAM P.31605-001 (245) Browse Island, 14° 06' S, 123° 33' E, 7 December 1997.

Choerodon zosterophorus. (9 specimens examined, 44.7–153 mm SL). **Philippines**: BPBM 23470* (148) Luzon, Batangas, Caban Island, 24 m, 27 July 1970; USNM 378714 (124) S tip of Buyallao Island off SE Mindoro, 12° 21' 42" N, 121° 27' 34" E, 0–20 m, 30 May 2000; USNM 436349 (43) Oriental Mindoro, Puerto Galera, off point immediately to W of Balatero Cove, 13° 30.813' N, 120° 55.786' E, 18–26 m, 2015. **Indonesia**: BPBM 29868* (103) Lombok, 6 February 1984; BPBM 32105* (109) Flores, 8° 34' 40" S, 122° 11' 55" E, 20 m, 17 September 1987; BMNH 1870.8.31.27* (153, lectotype of *Choerops brenchleyi*) Raja Ampat Islands, Misol Island; BMNH 1870.8.31.36* (147, paralectotype of *Choerops brenchleyi*) Raja Ampat Islands, Misol Island; BMNH 1870.8.31.85* (141, paralectotype of *Choerops brenchleyi*) Raja Ampat Islands, Misol Island); RMNH 6537* (131, presumed holotype of *Choerops zosterophorus*) Great Kei Island. **New Guinea**: MNHN A.8860* (117); BPBM 32434* (44.7) Laloata Island, 25 m, 27 October 1987.

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Notes on Victorian Iulomorphidae (Diplopoda: Spirostreptida)

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Abstract Mesibov, R. 2017. Notes on Victorian Iulomorphidae (Diplopoda: Spirostreptida). *Memoirs of Museum Victoria* 76: 113–120.
New locality records and illustrations are given for *Atelomastix solitaria* Jeekel, 2009, *Victoriocambala bidentata* Jeekel, 2009 and *V. buffalensis* Verhoeff, 1944. Diagnostic differences are reviewed for *Victoriocambala* Verhoeff, 1944 versus *Amastigogonus* Brölemann, 1913 and *Equestrigonus* Mesibov, 2017.

Keywords Diplopoda, Spirostreptida, Iulomorphidae, Victoria, Australia

Introduction

During a recent visit to Museum Victoria, I sorted the Museum's collection of spirostreptidan millipedes to morphospecies. Among the samples were specimens of the three previously described Victorian Iulomorphidae: *Atelomastix solitaria* Jeekel, 2009, *Victoriocambala bidentata* Jeekel, 2009 and *V. buffalensis* Verhoeff, 1944. Here I present new distribution records for the three species and add details to their published descriptions. Specimen locality records are available in table form and as keyhole markup language (KML) files on the Millipedes of Australia website, https://www.polydesmida.info/millipedesofaustralia/localities.html.

I was unable to examine any of the type or other published specimens of C.A.W. Jeekel for the three species. Following Jeekel's death in 2010, specimens in his possession and those he had deposited in the Zoological Museum in Amsterdam were transferred to the Naturalis Biodiversity Center in Leiden, the Netherlands. In 2014, a search in the Naturalis Biodiversity Center failed to yield the types of *V. bidentata* or Jeekel's published vouchers of *V. buffalensis* (K. van Dorp, *in litt.*, 17 Sep 2014). The types of *A. solitaria*, described from specimens in the South Australian Museum collection, were apparently not returned by Jeekel because they are not currently in the museum (P. Hudson, *in litt.*, 17 Mar 2017).

Abbreviations: NBC = Naturalis Biodiversity Center, Leiden, the Netherlands; NMV = Museum Victoria, Melbourne, Victoria, Australia; QVM = Queen Victoria Museum and Art Gallery, Launceston, Tasmania, Australia; SAM = South Australian Museum, Adelaide, South Australia, Australia; ZSM = Zoologische Staatssammlung München, München, Germany.

Atelomastix solitaria Jeekel, 2009

Zoobank LSID. http://zoobank.org/urn:lsid:zoobank.org:act:F603EFD5-9818-4B08-9348-F5C15750BD98

Figure 1

Atelomastix solitaria Jeekel, 2009: 31–34, figs 1–4; Edward & Harvey, 2010: 35; Korsós & Read, 2012: 45; Mesibov, 2017: 26.
Atelomastix sp. Jeekel, 1985: fig. 4.

Previous record. Male holotype and 2 male, 2 female and 4 juvenile paratypes, near Silverband Falls, Grampians, Victoria [–37.1960 142.5250 ±2 km], J.J.H. Szent-Ivany & M.L. Szent-Ivany, 6 May 1978, under bark of *Eucalyptus* sp. in forest, SAM (Jeekel 2009, p. 31).

Material examined. 1 male, 3 females, Broken Falls, Grampians, Victoria [–37.1110 142.4085 ±500 m], A. Burns, 30 Oct 1949, NMV K-13628; 1 male, 1 female, Grampians, Victoria [–37.2170 142.4350 ±20 km], collector unknown, 10 Nov 1949, NMV K-13655.

Description. Jeekel (2009) provides a detailed description of the types, but his notes on the anterior gonopod are brief. The Broken River male (fig. 1A) has sclerite **a** nearly erect, curving slightly posteriorly at apex, spatulate, concave posteriorly; small field of ca 12 short setae on anterolateral surface; medial margin slightly thickened subapically. Pseudoflagellum arising at ca 1/2 gonopod height on medial surface of sclerite **a**, thin, cylindrical, directed anterolaterally, tapering gradually to rounded tip basal to sclerite **a** tip; posterior surface of pseudoflagellum finely rugose. Sclerite **b** arising at ca 1/2 gonopod height, erect, reaching ca 5/6 gonopod height, directed slightly posteriorly, not expanded distally; distal margin oblique (lower posteriorly), slightly emarginate with sparse comb of short setae; posterior margin slightly sinuous. Sclerite **c** arising at ca 1/3–1/2 gonopod height, somewhat flattened mediolaterally and tapering to rounded tip, directed slightly laterally, strongly curving medially, reaching ca 2/3 gonopod height with 4–5 long well-spaced setae on medial surface at ca

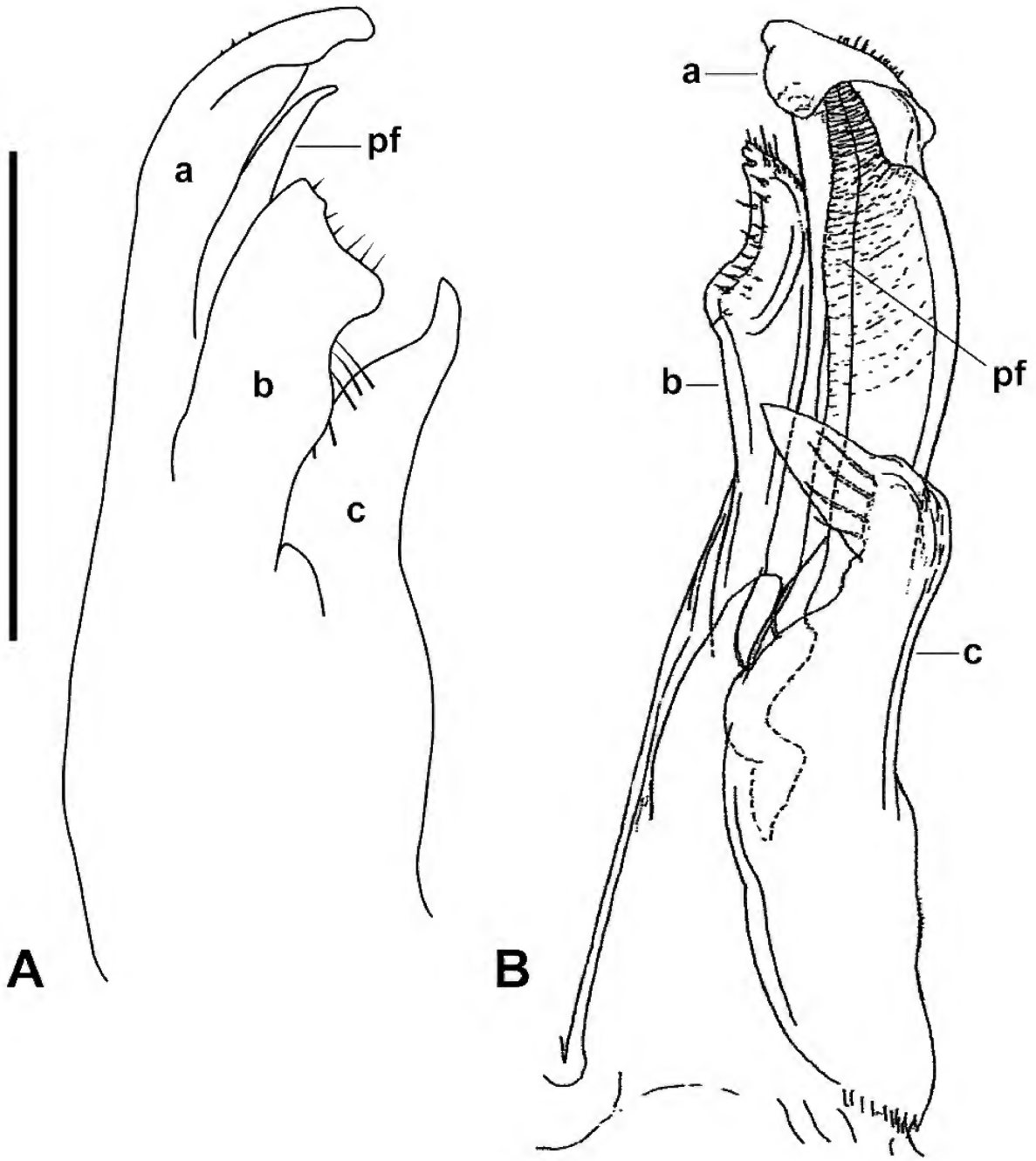

Figure 1. *Atelomastix solitaria* Jeekel, 2009, left anterior gonopod. **A**, medial and slightly posterior view of male from NMV K-13628; **B**, posterior and slightly ventral (i.e. distal) view of male holotype, de-speckled scan of fig. 4 in Jeekel (2009). Pseudoflagellum (**pf**) and sclerites **a**, **b** and **c** labelled; scale bar for **A** = 1.0 mm.

1/3–1/2 sclerite **c** height.

Distribution. So far known only from the Grampians National Park in western Victoria (fig. 2).

Remarks. Jeekel (2009, p. 34) wrote that he had previously illustrated the anterior gonopod of *A. solitaria* in Jeekel (1985), where the species is referred to as "*Atelomastix* spec. from South Australia [sic]". Fig. 5 in Jeekel (1985; p. 108) shows a posterior view of the right anterior gonopod and is close to a mirror image of the posterior view of the left anterior gonopod in fig. 4 of the 2009 paper (reproduced here in modified form as fig. 1B). Neither of the two anterior gonopod illustrations in Jeekel (2009) is in side view, leaving the shapes of the gonopod sclerites a little unclear. The medial view in fig. 1A will allow easier comparison with *Atelomastix* anterior gonopods, as illustrated in side view by Attems (1911), Edward and Harvey (2010) and Mesibov (2017).

Victoriocambala Verhoeff, 1944

Zoobank LSID. http://zoobank.org/urn:lsid:zoobank.org:act:330CE9AA-124D-47EF-BCCC-6B60BE370A96

Victoriocambala Verhoeff, 1944: 35, 41; Jeekel, 1971: 115; Hoffman, 1980: 91; Jeekel, 1981: 40; Jeekel, 1985: 106, fig 4; Mauriès, 1987: 196, 198; Korsós & Johns, 2009: 3; Jeekel, 2009: 35; Edward & Harvey, 2010: 5; Korsós & Read, 2012: 46.

Type species. *Victoriocambala buffalensis* Verhoeff, 1944, by monotypy.

Remarks. Verhoeff (1944, p. 41) noted that his new, monotypic *Victoriocambala* was most closely related to *Amastigogonus* Brölemann, 1913, a then-monotypic Tasmanian genus to which he added two new Tasmanian species. By the time Jeekel (2009) described a second Victorian *Victoriocambala* species, the number of Tasmanian *Amastigogonus* species had increased to four (Hoffman 1972; Mauriès *et al*.. 2001), and I have since added another six Tasmanian species (Mesibov, 2017). Consistent and taxonomically useful differences between species in the two genera are listed in Table 1.

The two *Victoriocambala* species share several characters with the Tasmanian endemic *Equestrigonus tasmaniensis* Mesibov, 2017. In all three cases, there is an apical fringe of long setae on the anterior gonopod telopodite, the leg 7 coxa is not elongated, there is a prominent tab anteriorly on the leg 1 prefemur and the leg 2 coxa, and prefemoral tabs begin on ring 5. *E. tasmaniensis* differs from the *Victoriocambala* species in diplosegment sculpture (suture weakly defined, longitudinal metazonite striae curving upwards towards suture), having a prominent setal crown on the posterior gonopod and the coxite process on the anterior gonopod directed posterodistally rather than parallelling the telopodite and protecting the pseudoflagellum (Mesibov, 2017). It seems likely that in a three-taxon molecular phylogeny, *Equestrigonus* and *Victoriocambala* would be more closely related than either is to *Amastigogonus*.

Victoriocambala bidentata Jeekel, 2009

Zoobank LSID. http://zoobank.org/urn:lsid:zoobank.org:act:CF72AC10-F464-42F6-BB72-1BE85208D37E

Figures 4C, 4D, 5A

Victoriocambala bidentata Jeekel, 2009: 35-38, figs 6-9.—Korsós & Read, 2012: 46.

Previous record. Male holotype and 4 male, 2 female and 5 juvenile paratypes, Drummer State Forest, 15 km E of Cann River, Victoria [–37.5765 149.3105 ±1 km], C.A.W. Jeekel & A.M. Jeekel-

Table 1. Character state differences between species of *Amastigogonus* Brölemann, 1913 and *Victoriocambala* Verhoeff, 1944.

	Victoriocambala	*Amastigogonus*
Diplosegment suture	distinct around entire ring (fig. 3A, s)	indistinct, ventrally undetectable
Metazonite striae	longitudinal, stop at suture (fig. 3A, ms)	curve upwards anteriorly, extend onto prozonite (fig. 3B, ms)
Prozonite striae	semi-annular (below ozopore) (fig. 3, ps)	absent
Male leg 1 coxosternite	in two pieces (fig. 4A)	in one piece (fig. 4B)
Male legl prefemur	nearly fused with coxa, not distinguishable anteriorly	clearly demarcated from coxa (fig. 4B)
Male leg 1 tarsus	fused with tibia (fig. 4A)	clearly demarcated from tibia (fig. 4B)
Male prefemoral pads	begin on leg 4 or 5 (ring 5) (fig. 3C, pt1)	begin on leg 10 (ring 8) (fig. 3D, pt1)
Male leg 7 coxa	same as other anterior coxae (fig. 3C, 7c)	elongated and distally swollen (fig. 3D, 7c; see also figs 2A, B in Mesibov, 2017)
Anterior gonopod telopodite	with apical fringe of setae	without apical fringe of setae
Posterior gonopod	with posterolateral bump or process bearing minute setae ("telopodite remnant"; fig. 4C)	without posterolateral bump or process

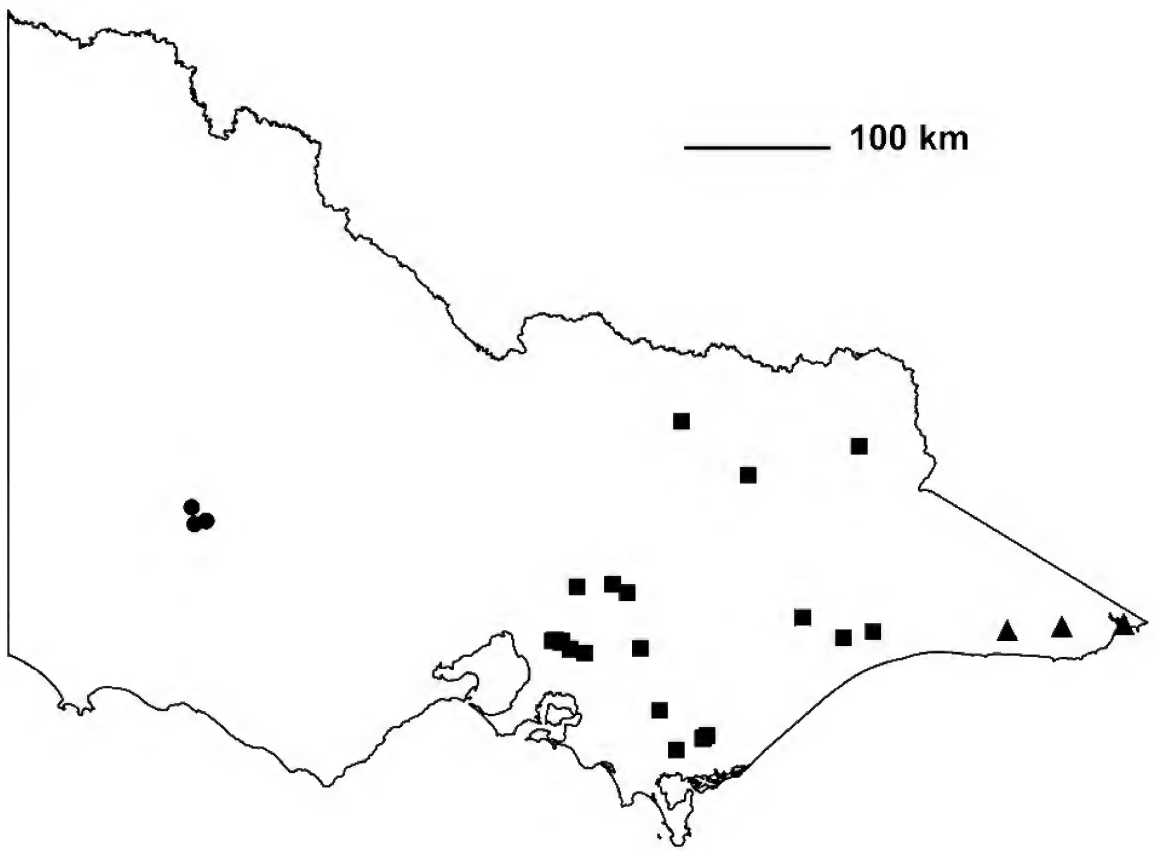

Figure 2. Map of Victoria showing known localities as of 1 March 2017 for *Atelomastix solitaria* Jeekel, 2009 (circles), *Victoriocambala bidentata* Jeekel, 2009 (triangles) and *V. buffalensis* Verhoeff, 1944 (squares). Mercator projection.

Rijvers, 13 Nov 1980, Australia Expedition station 84, *Eucalyptus* forest along Princes Highway, under logs, Naturalis Biodiversity Center (Jeekel 2009, p. 35).

Material examined. 1 male, 1 female, McKenzie River on Princes Highway, 20 km NE of Cabbage Tree Creek ("196357"), Victoria [–37.6294 148.8845 ±500 m], Australian Biological Resources Study snail survey, 13 Apr 1975, NMV K-13634; 1 male, Marshmead Bush Blitz, end of Lakeview Road, Victoria, 37° 31.565' S 149° 47.646' E [37.5261 149.7941 ±100 m], S. Hinkley & P. Lillywhite, 3 Dec 2016, beating and direct search, NMV K-13651.

Distribution. Known from three localities in far East Gippsland, Victoria (fig. 2).

Remarks. This species is easily recognised by the tooth on the anterodistal margin of the anterior gonopod telopodite (fig. 5A, t) and by the thinness of the tip of the coxite process (fig. 4D).

Victoriocambala buffalensis Verhoeff, 1944

Zoobank LSID. http://zoobank.org/urn:lsid:zoobank.org:act:0BA89A30-C7D6-4437-90B7-A427AD8E2CF3

Figures 4A, 4E, 4F, 5B, 5C

Victoriocambala buffalensis Verhoeff, 1944: 42–43, figs 9–12; Jeekel, 1971: 115; Jeekel, 1981: 40; Jeekel, 2009: 38–41, figs 10–13; Korsós & Read, 2012: 46.

Previous records. Male holotype (Verhoeff described only one male specimen), Mt Buffalo, Victoria [–36.7760 146.7670 ±10 km], date unknown, possibly collected by G.E. Nicholls, ZSM 20060631; [the following five records are from Jeekel, 2009, p. 38] 1 female, Gunyah Gunyah, 32 km SSW of Morwell, Victoria [–38.5306 146.3286 ±100 m], station 92, C.A.W. Jeekel & A.M. Jeekel-Rijvers, 17 Nov 1980, timber track along Grand Ridge Road, temperate rainforest with tree ferns, under logs and litter and in rotting trees; 1 juvenile, Mt Taylor, 11 km NNW of Bairnsdale, Victoria [–37.7578 147.5986 ±1 km] station 87, same collectors, 14 Nov 1980, fragment of *Eucalyptus*

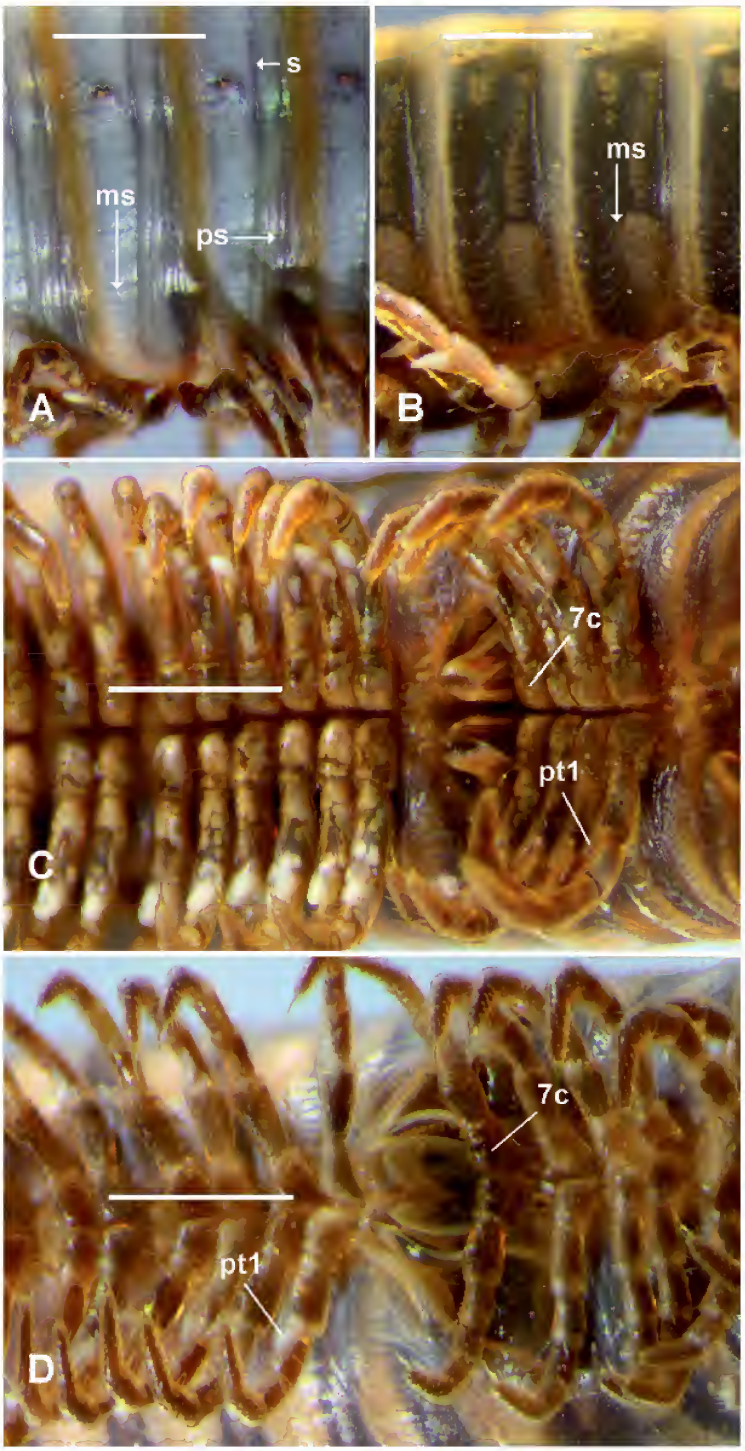

Figure 3. *Victoriocambala buffalensis* Verhoeff, 1944, NMV K-13624 (**A**, **C**) and *Amastigogonus tasmanianus* Brölemann, 1913, QVM 23:54414 (**B**, **D**). **A**, **B**, right lateral views (anterior to right) of midbody rings showing suture (**s**), metazonite striae (**ms**) and prozonite striae (**ps**). **C**, **D**, ventral views of anterior portion of body (anterior to right) showing first prefemoral tab (**pt1**) and leg 7 coxa (**7c**). Scale bars = 1.0 mm.

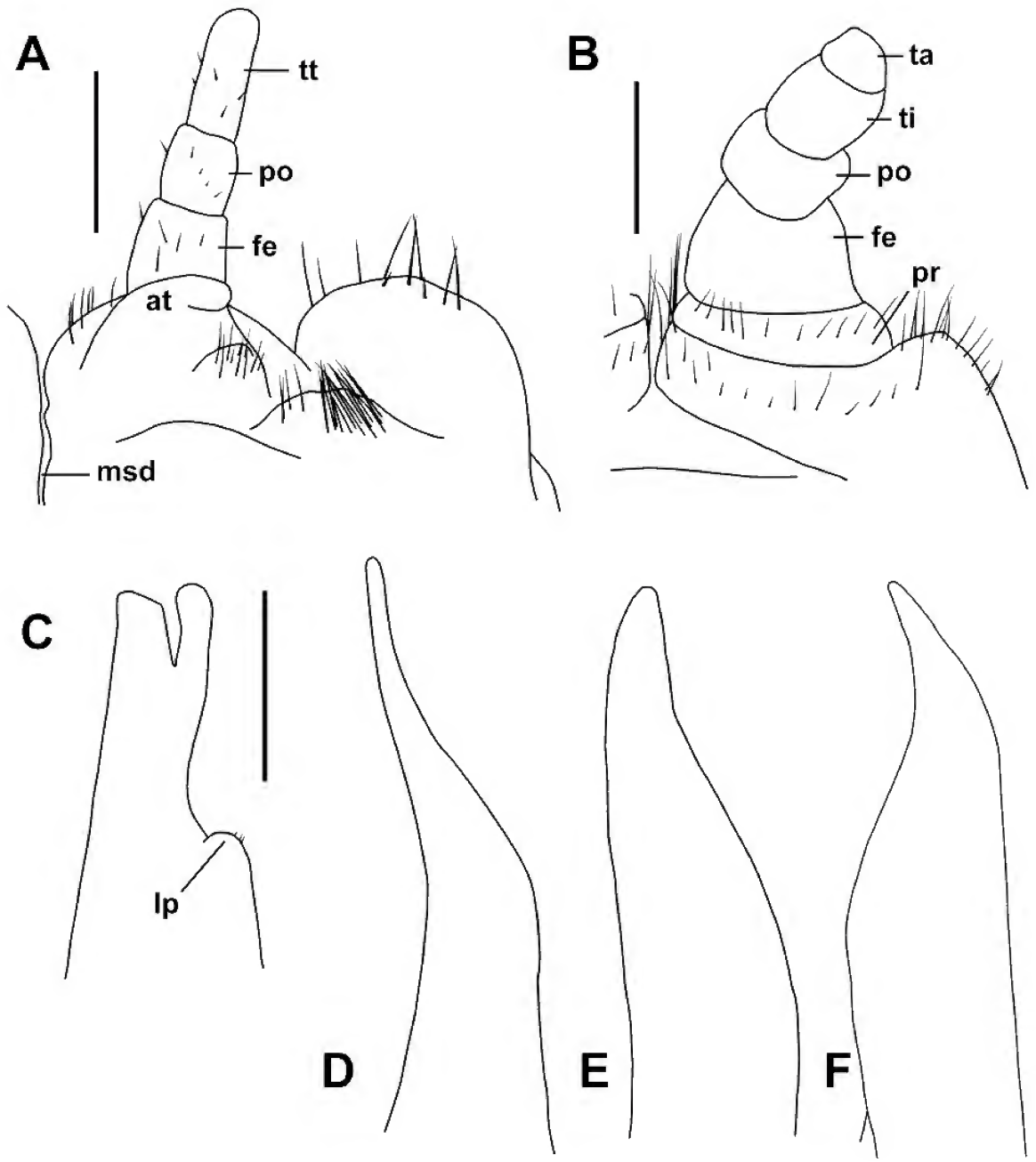

Figure 4. *Victoriocambala buffalensis* Verhoeff, 1944 (**A**, **F**, NMV K-13624; **E**, NMV K-12000), *Amastigogonus tasmanianus* Brölemann, 1913 (**B**, QVM 23:54414) and *V. bidentata* Jeekel, 2009 (**C**, **D**, NMV K-13651). **A**, **B**, anterior views of left leg 1. **C** posterior view of right posterior gonopod. **D**–**F**, lateral outlines of distal portion of coxite process on left anterior gonopod (anterior to left). **at** = anterior tab on prefemur, **fe** = femur, **lp** = lateral process (telopodite remnant), **msd** = median sternite division, **po** = postfemur, **pr** = prefemur, **ta** = tarsus, **ti** = tibia, **tt** = fused tibiotarsus. Scale bars for **A**–**C** = 0.25 mm; **D**–**F** not to scale.

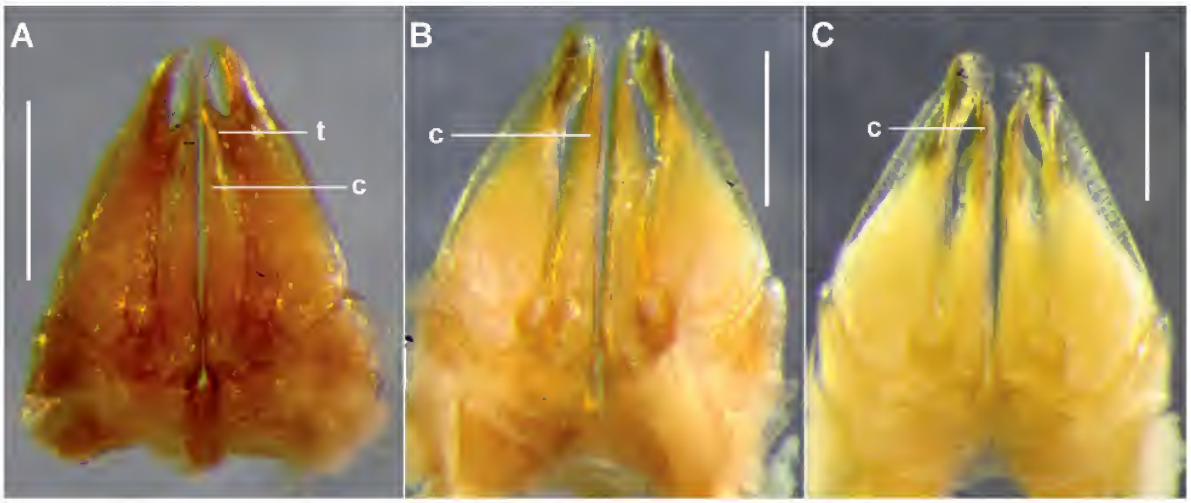

Figure 5. *Victoriocambala bidentata* Jeekel, 2009 (**A**, NMV K-13634) and *V. buffalensis* Verhoeff, 1944 (**B**, NMV K-13646; **C**, NMV K-13625). Anterior views of anterior gonopods. **c** = coxite process, **t** = tooth on telopodite margin. Scale bars = 0.5 mm.

forest, along roadside between grassland, under logs; 1 male, Tarra National Park, Victoria [–38.4289 146.5669 ±1 km], station 91, same collectors, along nature track in temperate rainforest with tree ferns, under logs and in soil; 2 males, 2 females, Ferntree Gully National Park, 18 km NNE of Dandenong, Victoria [–37.8800 145.3185 ±500 m], station 93, same collectors, 18 Nov 1980, along nature track in temperate rainforest with tree ferns, under logs and litter and in rotting trees; 5 males, 13 females, 4 juveniles, Glenaladale National Park, 28 km WNW of Bairnsdale, Victoria [–37.6500 147.2667 ±5 km], station 88, same collectors, 15 Nov 1980, dry rainforest along creek, along nature track, under logs and stones, and in litter.

Material examined. 1 male, Glenrowan, Victoria [–36.4620 146.2240 ±5 km], W. Kershaw, date unknown, NMV K-13633; 1 male, 2 females, Thorpdale, Victoria [–38.2890 146.1760 ±5 km], collector unknown, 1 Apr 1899, O.A. Sayce purchase 25 Jul 1911, NMV K-13625; 1 male, 2 females, Gembrook, Victoria [–37.9530 145.5540 ±5 km], J. Kershaw, Nov 1901, NMV K-13646; 1 male, 2 females, Emerald district, Victoria [–37.9320 145.4400 ±10 km], E.N. Jarvis, Aug 1904, NMV K-13629; 2 males, 3 females, 1 juvenile (fragments), either Neerim North Post Office or Noojee (unclear if site or collector address), Victoria [–37.9030 145.9980 ±5 km], T.G. Robinson, 8 Jul 1908, NMV K-13623; 3 males, 1 female, Toolangi near Healesville, Victoria [–37.5360 145.4710 ±5 km], J.A. Kershaw, 16 Nov 1909, NMV K-13624; 3 males, Gippsland, Victoria, J.E. Dixon, 1 Jul 1914, NMV K-13640; 1 male, Bruthen, Victoria [–37.7070 147.8320 ±5 km], Dr J.A. Leach, 12 Mar 1917, NMV K-13644; 1 male, 2 females, Bruthen, Victoria [–37.7070 147.8320 ±5 km], J. Barling, 3 Jan 1918, NMV K-13645; 1 male (fragments), Marysville, Victoria [–37.5100 145.7480 ±2 km], G.F. Hill, 19 Aug 1923, NMV K-13654; 1 male, 1 female, Ferntree Gully, Victoria [–37.8840 145.2950 ±2 km], G.F. Hill, 22 Feb 1924, NMV K-13635; 1 male, Sherbrooke Forest, Ferntree Gully, Victoria [–37.8938 145.3635 ±2 km], A. McEvey, 25 Sep 1969, "a bird used this sp of millipedes for anting", NMV K-13650; 1 male, near Shady Creek, Dartmouth Survey locality LN, Victoria [–36.5500 147.6167 ±2 km], Field Survey Group, Field Naturalists Club of Victoria, 3 Mar 1973, NMV K-13643; 1 female, Tarra-Bulga National Park, 0.5 km NNE of Tarra Valley Picnic Area, Victoria, 38° 26' 40" S 146° 32' 30" E [–38.4444 146.5417 ±1 km], G. Milledge, 14 Nov 1995, direct search, NOH 2239, NMV K-13637; 1 male, The Big Culvert, 2.5 km ENE of Mt Observation, Victoria, 37° 33' 36" S 145° 52' 15" E [–37.5600 145.8708 ±100 m] G. Milledge, 19 Feb 1996, direct search, NOH 1892, NMV K-13631; 1 male, Tarra-Bulga National Park, 0.2 km W of Tarra Valley Picnic Area, Victoria, 38° 27' S 146° 32' E [–38.4500 146.5333 ±2 km], G. Milledge, 6 Mar 1996, direct search, NOH 2238, NMV K-13639; 1 male, 2 juveniles, Dandenong Ranges National Park, ca 0.22 km WNW of Kallista roundabout, Kallista Project Site OS1A, Victoria, 37° 53.066' S 145° 22.006' E [–37.8844 145.3668 ±25 m], 420 m a.s.l., N. Porch & A. Lodewyke, 18 Apr 2013, open ground under tree ferns and dead holly on E slope in mountain ash (*Eucalyptus regnans*) forest, Berlesate of all leaf litter on 2 m by 2 m grid, NMV K-11998; 1 male, Dandenong Ranges National Park, ca 0.21 km SW of Kallista roundabout, Kallista Project Site SF2A, Victoria, 37° 53.112' S 145° 22.065' E [–37.8863 145.3678 ±25 m], 395 m a.s.l., N. Porch & A. Lodewyke, 20 Apr 2013, shield fern (*Polystichum proliferum*) dominated ground under open canopy, mountain ash (*Eucalyptus regnans*) forest, E slope, Berlesate of all leaf litter on 2 m by 2 m grid; NMV K-12000

Distribution. As circumscribed here (see Remarks); *V. buffalensis* is widespread in eastern Victoria (fig. 2).

Remarks. More than one species may be included here as *V. buffalensis*. As noted by Jeekel (2009, p. 41), "This species seems rather unstable in various characters", among them the shape of the coxite process. The process is fairly straight in specimens from parts of Gippsland and the mountains north-east of Melbourne (figs 4E, 5B and fig. 10 in Jeekel, 2009), but elsewhere in eastern Victoria, the tip is bent anterolaterally (figs 4F, 5C and fig. 12 in Verhoeff, 1944) the posterior surface is depressed, and the anterior and lateral surfaces bowed outwards around the depression (figs 4F, 5C). I have not noticed any other differences between specimens with the two coxite process forms, and I am reluctant to erect new *Victoriocambala* species without more intensive sampling across the *V. buffalensis* range.

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I am grateful to Peter Lillywhite and Catriona McPhee (NMV) for assistance with the registration and loan of specimens during my visit to Museum Victoria in February 2017, to Karen van Dorp (NBC) and Peter Hudson (SAM) for advice on specimen holdings, and to reviewers Nesrine Akkari and Sergei Golovatch for helpful comments on the draft manuscript. This study was funded by the author.

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New asterinid seastars from the western Pacific Ocean (Echinodermata: Asteroidea)

(http://zoobank.org/urn:lsid:zoobank.org:pub: 488E9F74-5E69-42B1-A12A-4E5239D9998D)

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Abstract O'Loughlin, P.M. and Bribiesca-Contreras, G. 2017. New asterinid seastars from the Pacific Ocean (Echinodermata: Asteroidea). *Memoirs of Museum Victoria* 76: 121–132.

Three new *Aquilonastra* O'Loughlin (in O'Loughlin and Waters, 2004) species are described: *Aquilonastra donia* sp. nov. for New Caledonia, lodged in the Muséum national d'Histoire naturelle in Paris; *Aquilonastra korora* sp. nov. and *Aquilonastra starmeri* sp. nov., both for Palau and lodged in the Florida Museum of Natural History.

Keywords New Caledonia, Palau, *Aquilonastra*, new species.

Introduction

O'Loughlin and Waters (2004) provided a comprehensive revision of genera of Asterinidae based on morphological and limited molecular genetic data. Within this work they established the new genus *Aquilonastra* O'Loughlin and provided a key to Asterinidae genera. O'Loughlin and Rowe (2006) revised genus *Aquilonastra* based on morphological observations. Thirteen new species were described and a key to *Aquilonastra* species was provided. O'Loughlin (2009), O'Loughlin and Mackenzie (2013), and O'Loughlin and Bribiesca-Contreras (2015) added new species of *Aquilonastra*. O'Loughlin and Bribiesca-Contreras (2015) provided a revised key to *Aquilonastra* species. We recognise the need for further revision of Asterinidae based on comprehensive genetic data. We assign the current new species from the Pacific Ocean to *Aquilonastra* based on morphological observations only, and acknowledge some uncertainty with these assignments.

Methods

For photography purposes, the alcohol-preserved specimen was allowed to partly air-dry. Photographs were taken using a Cannon 5D Mark II camera with a Cannon 65 mm macro lens and a 100 mm lens. Series of photographs were taken and stacked using the Zerene Stacker software.

After assembling the whole-specimen montage photographs, a ray from each of the three type specimens was cut off for the purpose of observing external and internal skeletal structure. The distal end of each of these three cut-off arms was cleared briefly in bleach and then washed in water. Photographs were taken to show internal skeletal structures.

Definitions and illustrations of terms

For definitions and illustrations of terms used, such as superactinal plates, superambulacral plates, sacciform spinelets and splay-pointed spinelets, see O'Loughlin and Waters (2004).

Abbreviations

MNHN Muséum national d'Histoire naturelle.
UF Florida Museum of Natural History, University of Florida.

Asterinidae Gray, 1840

Synonymy. See Clark and Downey, 1992.

Diagnosis. See Clark and Downey, 1992.

Remarks. For a recent revision of Asterinidae, see O'Loughlin and Waters (2004). For the addition of genus *Ailsastra*, see O'Loughlin and Rowe (2005).

Aquilonastra O'Loughlin, 2004 (in O'Loughlin and Waters, 2004)

Aquilonastra O'Loughlin, in O'Loughlin and Waters, 2004: 5 (key to genus), 13–15, tables 1, 2.—O'Loughlin and Rowe, 2005: 181.—Saba and Fujita, 2006: 270.—Byrne, 2006: 244, 245, 248, 250, 251.—O'Loughlin and Rowe, 2006: 257–287 (key to species).—O'Loughlin, 2009: 204, fig. 1.—O'Loughlin and Mackenzie, 2013: 177–180, figs 1, 2.—O'Loughlin and Bribiesca-Contreras, 2015: 33–46, figs 1–8 (revised key to species).

Diagnosis (from O'Loughlin and Bribiesca-Contreras, 2015). Rays 5, or 5–8 in fissiparous species; inter-radial margin deeply

incurved, form stellate; rays discrete, broad at base, tapering, rounded distally; flat actinally, convex abactinally; abactinal plates in longitudinal series, not perpendicular to margin; papulate areas extensive; papulae predominantly single, large, in longitudinal series along sides of rays; abactinal plates with glassy convexities; abactinal spinelets and actinal spines predominantly fine, glassy, conical or sacciform or splay-pointed sacciform, in bands or tufts, numerous (10–40 per plate); actinal plates in longitudinal, sometimes oblique, series; superambulacral plates present for all of ray, sometimes for part of ray or absent in paedomorphic species; superactinal plates present.

Remarks. We have not further revised the morphological diagnosis of genus *Aquilonastra* to accord with variations observed here, such as a shallow incurved junction of rays in two of the species below and the absence of superambulacral plates in one of the species below. We anticipate a necessary extensive revision when adequate genetic data become available.

Aquilonastra donia sp. nov.

Zoobank LSID. http://zoobank.org/urn:lsid:zoobank.org:act:C41D2993-A090-4D51-A8B9-C15A29B271B3

Figures 1, 2, 3a–d.

Material examined. Holotype. New Caledonia, Yaté reef flat, coll. Gaillande, July 1970, MNHN-IE-2014-641 (original registration MNHN EcAs11855) (dry; many spinelets and pedicellariae lost with handling over time).

Description. Asterinid seastar, five sub-equal rays, rays wide basally, bluntly rounded distally, R = 22 mm, r = 15 mm, rays merge at bases, inter-radial junction of rays shallow in-curved, central rays elevated and rounded abactinally, distinct broad inter-radial low non-papulate apron marginally, rays flat actinally, margin acute. No abactinal or actinal gonopores detected. Single madreporite. Not fissiparous. Superomarginal and inferomarginal plates sub-equal, superomarginal plates in discrete series, slightly larger than adjacent distal abactinal plates, inferomarginal plates projecting outwards. Broad low marginal apron up to 7 plates across longitudinally, supported by internal superactinal plates; superambulacral plates present, small. Glassy convexities on cleared abactinal and actinal plates.

Abactinal: disc discrete, small, demarcated irregularly by 5 wide doubly papulate radial plates and 5 smaller inter-radial plates; single conspicuous madreporite, above junction of bases of two rays; pedicellariae present inter-radially, proximally and distally, conspicuous, frequently longer than adjacent spinelets, each comprising two stout, in-curved pointed conical teeth, present on proximal edges of inter-radial plates over concave indentation for papula; abactinal plates imbricate, indented proximally for single papula; no regular carinal series of plates, but a few doubly papulate carinal plates along some proximal upper rays; few small secondary plates on disc, rays and marginal apron; abactinal papular plates in about 7 longitudinal series down each side of each ray, plates with elevated rounded proximal edge, about 20 papular plates in uppermost series, 1–2 in lowest series; distal inter-radial plates on apron in longitudinal series parallel to the rays and oblique curved series from the ray to the margin. Abactinal spinelets readily lost: up to at least 20 digitiform spinelets over crown of proximal plates, not in tufts, distal spinelets slender conical to subsacciform; up to about 5 slender conical spinelets per superomarginal plate.

Actinal: inter-radial plates in longitudinal series parallel to the ambulacrum and oblique transverse series from the ambulacrum to the margin. Actinal spines per plate: oral 6, long digitiform to conical proximally, to short distally; sub-oral about 5, long conical proximally to short distally; furrow 4–5 long conical; subambulacral 4–5 long conical; actinal 2–3, mostly 2, long conical; inferomarginal up to about 16, thick digitiform actinally to thin conical subsacciform abactinally.

Distribution. New Caledonia, reef flat.

Etymology. Original collection record is New Hebrides, now New Caledonia, and named for the *donia* ending to Caledonia.

Remarks. The long abactinal pedicellariae, with 2 conical pointed and curved valves that are frequently longer than adjacent spinelets, and actinal inter-radial plates with predominantly 2 spines, are distinguishing feature of *Aquilonastra donia* sp. nov. Other *Aquilonastra* species with prominent pedicellariae with differentiated valves (teeth) are distinguished by: *Aquilonastra anomala* (H.L. Clark, 1921) is fissiparous with multiple madreporites; *Aquilonastra batheri* (Goto, 1914) has tufts of splayed abactinal spinelets, and up to 12 actinal inter-radial spines; *Aquilonastra corallicola* (Marsh, 1977) is fissiparous and has two different forms of spinelets on the paxilliform upper ray plates; *Aquilonastra coronata* (Martens, 1866) has irregularly distributed high paxilliform abactinal plates with two different forms of spinelets; *Aquilonastra iranica* (Mortensen, 1940) has up to 5 doubly papulate proximal carinal plates and the spinelets on proximal abactinal plates are in small groups; *Aquilonastra richmondi* O'Loughlin and Rowe, 2006 has spinelets of two forms on abactinal plates; *Aquilonastra rowleyi* O'Loughlin and Rowe, 2006 has a disc that is delineated by a dense band of spinelets on wide radial plates, each plate with about 100 long thin pencil-like glassy spinelets; *Aquilonastra shirleyae* O'Loughlin, 2009 has spinelets in splayed clusters and up to 10 actinal inter-radial spines per plate; *Aquilonastra watersi* O'Loughlin and Rowe, 2006 has abactinal spinelets in clusters.

Aquilonastra kororа sp. nov.

Zoobank LSID. http://zoobank.org/urn:lsid:zoobank.org:act:765787CA-CF22-4FF5-8637-497D9E9FA85D

Figures 4, 5, 6a–d.

Material examined. Holotype. Palau, Koror, Mutremdiu reef, rock, 30 m, coll. J. Starmer, 19 Aug 1995, code BEL–276, UF 2437 (fixed in formalin, dry; many spinelets and pedicellariae lost with handling over time).

Description. Asterinid seastar, five sub-equal rays nearly digitiform, rays wide basally, narrowly rounded to pointed distally, R = 25 mm, r = 10 mm, rays merge at bases, inter-radial junction of rays deeply in-curved, central rays elevated and rounded abactinally, weakly evident low sloping distal abactinal margin, no distinct apron; rays flat actinally, margin acute. Abactinal gonopores detected. Single madreporite. Not

Figure 1. Montage photograph of the holotype of *Aquilonastra donia* sp. nov. (MNHN-IE-2014-641). Abactinal view showing five sub-equal rays, distinct low marginal apron, absence of carinal series of plates, presence of rare doubly papulate carinal plates, and single large madreporite. The abactinal plates have become denuded of most spinelets over time.

Figure 2. Montage photograph of the holotype of *Aquilonastra donia* sp. nov. (MNHN-IE-2014-641). Actinal view showing five sub-equal rays, spination, longitudinal and oblique-transverse series of actinal plates.

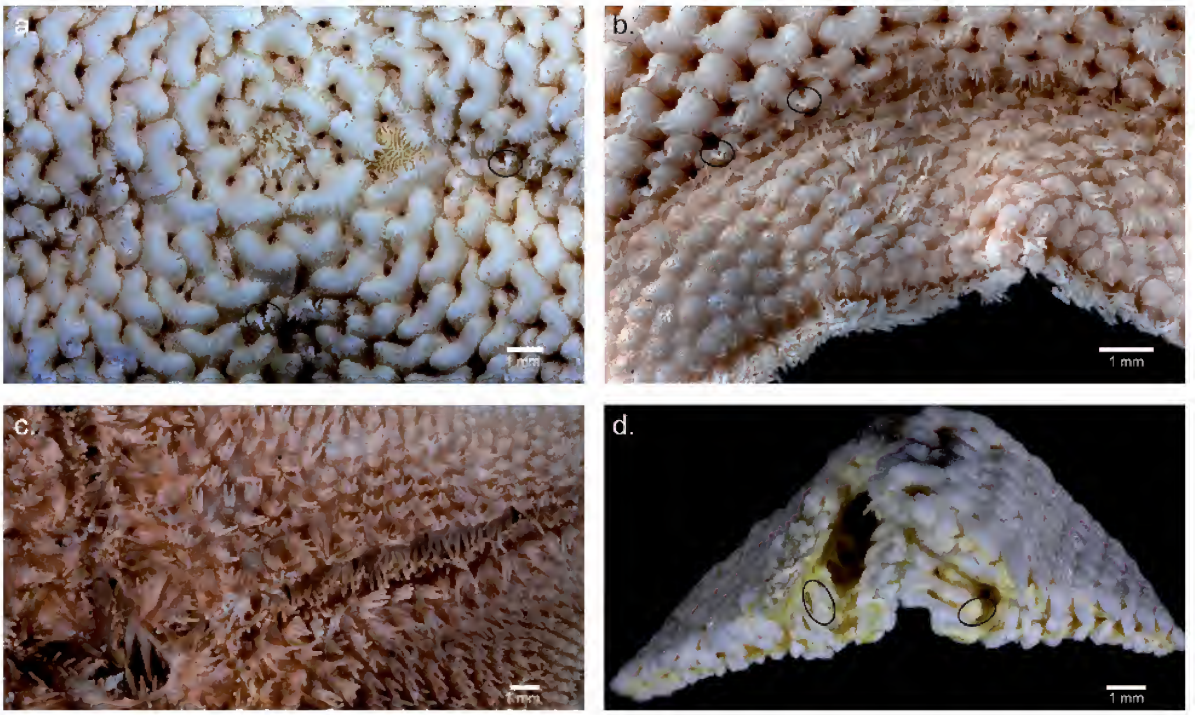

Figure 3. Montage photographs of the holotype of *Aquilonastra donia* sp. nov. (MNHN-IE-2014-641): a, abactinal view of disc, single large madreporite, some remaining digitiform spinelets, and pedicellariae (highlighted); b, abactinal details of distal interradius showing pedicellariae (highlighted), and conical to sub-sacciform spinelets on apron; c, actinal view showing oral, suboral, furrow and inter-radial spines; d, transverse section of a ray with superactinal (highlighted left) and superambulacral plates (highlighted right).

fissiparous. Fairly irregular series of superomarginal plates, subequal with adjacent abactinal and inferomarginal plates, inferomarginal plates project narrowly outwards. Narrow sloping margin up to about 5 plates across longitudinally, supported by some internal superactinal plates, distal marginal abactinal and actinal plates contiguous internally; superambulacral plates absent with tissue strengthening only of junction internally between ambulacral and actinal plates. Glassy convexities on cleared abactinal and actinal plates.

Abactinal: disc discrete, small, demarcated irregularly by 5 bean-shaped non-papulate radial plates and 5 slightly smaller inter-radial plates, disc plates papulate, distal abactinal plates on rays not papulate; single conspicuous madreporite, above junction of bases of two rays; pedicellariae present inter-radially, proximally, low, not conspicuous, each comprising two short thick blunt teeth, present on proximal edges of inter-radial plates over concave indentations for papulae; abactinal plates imbricate, indented proximally for predominantly 1 rarely 2 papulae; no regular carinal series of plates, rare doubly papulate carinal plates present; rare small secondary plates on disc and proximal upper rays; abactinal plates in about 3 longitudinal series down each side of each ray, plates with elevated rounded proximal edge, up to about 20 papular plates in uppermost series, about 10 in mid-series, about 4–7 in lowest series; distal inter-radial plates in longitudinal and irregularly distributed oblique series. Abactinal spinelets readily lost: abactinal spinelets finely sacciform with needle-like long taper, up to at about 16 spinelets across proximal raised edge of proximal plates, not in tufts, distal spinelets slender conical to subsacciform; up to about 2–3 small fine sacciform acicular spinelets on crowns of superomarginal plates.

Actinal: inter-radial plates in longitudinal series parallel to the ambulacral furrow, some oblique transverse series from the ambulacrum, distal inter-radials irregular in distribution. Actinal spines per plate: oral up to 9, long conical proximally, to short distally; suboral up to 6, 3 long conical proximally, 2–3 shorter on each side of plate distally; furrow 5–6 conical subsacciform, 2 long apically, 1–2 short laterally on each side of plate; subambulacral up to 8, 2 long subsacciform conical apically, 3 short conical on each side of plate; actinal predominantly 2, subsacciform conical; inferomarginal predominantly about 5 sacciform.

Distribution. Palau, rocky reef, 30 m.

Etymology. Named *korora* for Koror, the state in Palau where the type was collected.

Remarks. A diagnostic character of genus *Aquilonastra* is the presence of superambulacral plates. *Aquilonastra korora* sp.

Figure 4. Montage photograph of the holotype of *Aquilonastra korora* sp. nov. (UF 2437). Abactinal view showing residual colouration, five sub-equal digitiform rays, absence of carinal series of plates, single large madreporite (lower arrow) and at least one conspicuous abactinal gonopore (upper arrow). The abactinal plates have become denuded of most spinelets over time.

Figure 5. Montage photograph of the holotype of *Aquilonastra korora* sp. nov. (UF 2437). Actinal view showing residual actinal colouration, five sub-equal rays, spination, longitudinal and oblique-transverse series of actinal plates with irregular distal inter-radials.

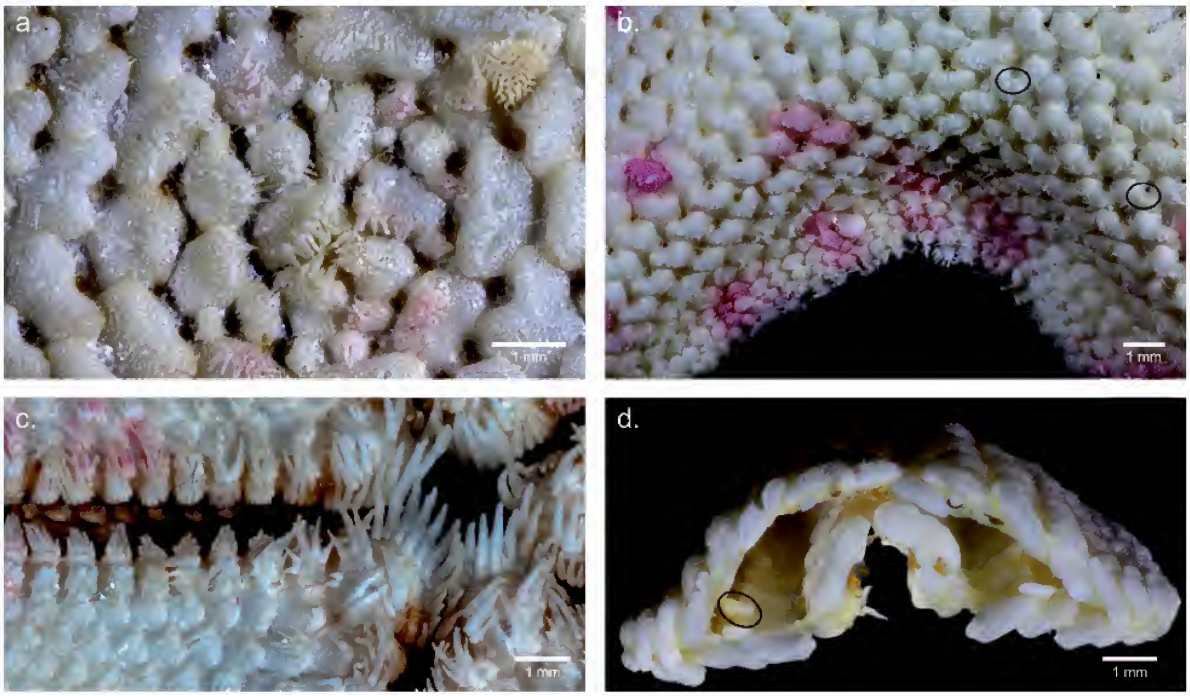

Figure 6. Montage photographs of the holotype of *Aquilonastra korora* sp. nov. (UF 2437): a, abactinal view of disc, showing disc plate arrangement, single large madreporite (top right), sacciform spinelets; b, abactinal details of distal interradius showing short blunt pedicellariae (highlighted) and residual slender conical, sub-sacciform and sacciform spinelets; c, actinal view showing oral, suboral, furrow and actinal interradial spines; d, transverse section of a ray with a superactinal plate highlighted.

nov. is thus unique among *Aquilonastra* species in lacking such plates, but the species conforms well in most ways with the diagnosis of the genus and is assigned to this genus, with reservations, as the most appropriate existing genus. The presence of low pedicellariae with two short thick blunt teeth and predominantly 2 actinal inter-radial spines per plate are distinguishing characters. There are additional characters that distinguish *Aquilonastra korora* sp. nov. from other *Aquilonastra* species that have distinctive pedicellariae: *Aquilonastra anomala* (Clark, 1921) and *Aquilonastra corallicola* (Marsh, 1977) have up to 8 rays and are fissiparous with multiple madreporites; *Aquilonastra batheri* (Goto, 1914) has tufts of splayed abactinal spinelets and up to 12 actinal inter-radial spines; *Aquilonastra coronata* (Martens, 1866) has irregularly distributed high paxilliform abactinal plates with two different forms of spinelets; *Aquilonastra iranica* (Mortensen, 1940) has up to 5 doubly papulate proximal carinal plates and the spinelets on proximal abactinal plates are in clusters; *Aquilonastra rowleyi* O'Loughlin and Rowe, 2006 has a disc that is delineated by a dense band of spinelets on wide radial plates, each plate with about 100 long thin pencil-like glassy spinelets; *Aquilonastra shirleyae* O'Loughlin, 2009 has spinelets in splayed clusters and up to 10 actinal inter-radial spines per plate; *Aquilonastra watersi* O'Loughlin and Rowe, 2006 has pedicellariae with differentiated valves but has doubly papulate proximal carinal plates and abactinal spinelets in clusters. All of these species have superambulacral plates. We note that *Aquilonastra corallicola* was described for Palau.

Aquilonastra starmeri sp. nov.

Zoobank LSID. http://zoobank.org/urn:lsid:zoobank.org:act:8B1FF925-A45F-4268-BDFE-C5F262C420D2

Figures 7, 8, 9a–d.

Material examined. Holotype. Palau, off NE Ngeryktabe Island, rocky islets, 7° 18.26' N, 134° 27.25' E, 10 m, coll. J. Starmer, 5 Mar 2003, code BPAL–081, photo GP 954, UF 1612 (in 75% ethanol; many spinelets lost with handling over time).

Description. Asterinid seastar, five sub-equal rays, rays wide basally, bluntly rounded distally, R = 20 mm, r = 12 mm, rays merge at bases, inter-radial junction of rays with shallow in-curve, central rays with high elevation and rounded abactinally, distinct broad inter-radial low non-papulate apron marginally, up to about 7 plates wide longitudinally, rays flat actinally, margin acute. Not fissiparous. No abactinal or actinal gonopores detected. No pedicellariae detected. Superomarginal plates in irregular series, slightly smaller than projecting inferomarginal plates, subequal in size with adjacent irregular apron plates. Broad low proximal marginal apron supported by internal superactinal plates, outer marginal apron supported by

Figure 7. Montage photograph of the holotype of *Aquilonastra starmeri* sp. nov. (UF 1612). Abactinal view showing five sub-equal rays, distinct marginal apron, lacking carinal series of plates, single large madreporite. The abactinal plates have become denuded of most spinelets over time.

Figure 8. Montage photograph of the holotype of *Aquilonastra starmeri* sp. nov. (UF 1612). Actinal view showing five sub-equal rays, spination, longitudinal and oblique-transverse series of actinal plates.

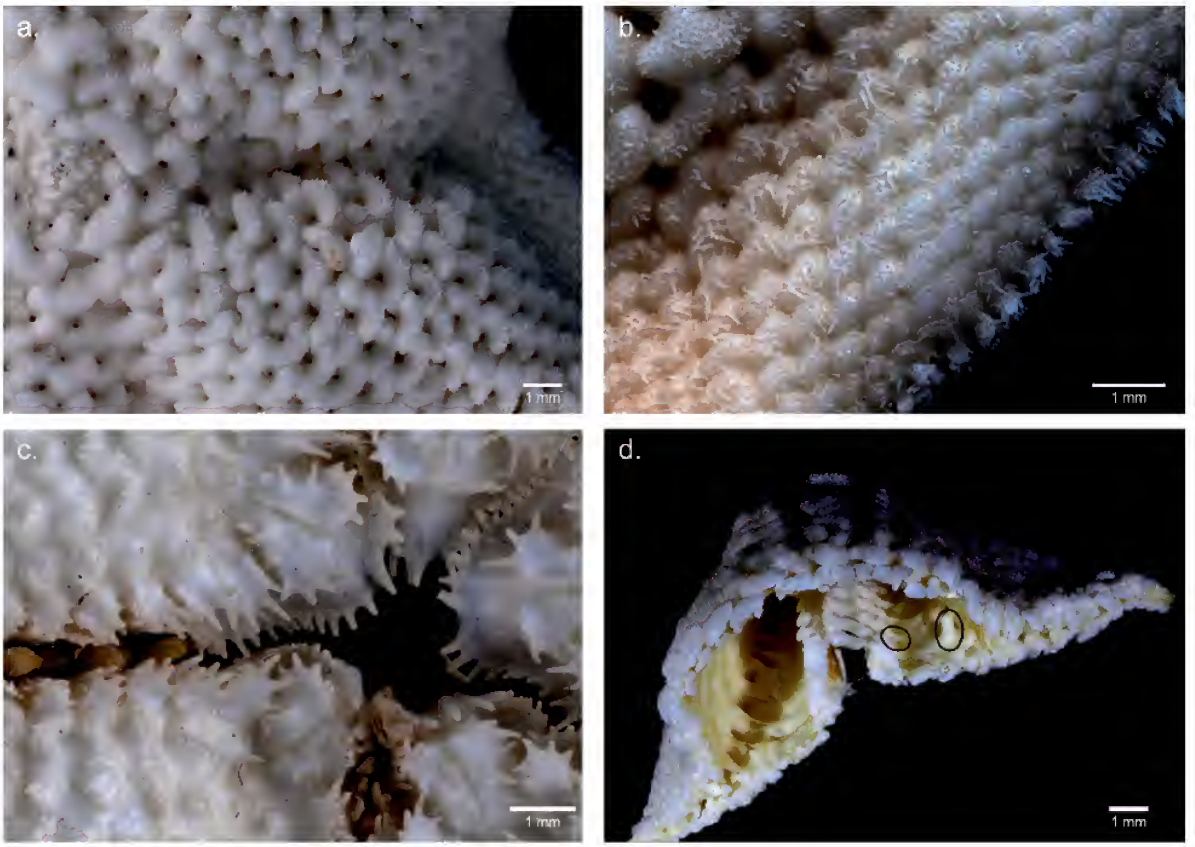

Figure 9. Montage photographs of the holotype of *Aquilonastra starmeri* sp. nov. (UF 1612): a, abactinal view of disc (left) and proximal ray plates with short conical to digitiform spinelets; b, abactinal details of distal interradius showing acicular conical to subsacciform spinelets on apron, and supero- and inferomarginal plates; c, actinal view showing oral, suboral, furrow and actinal interradial spines; d, transverse section of a ray with superambulacral plate (left) and superactinal plate (right) highlighted.

contiguous abactinal and actinal plates; some small superambulacral plates present. Glassy convexities on cleared abactinal and actinal plates.

Abactinal: disc discrete, small, demarcated irregularly by 5 wide doubly or singly papulate radial plates and 5 smaller interradial plates; single conspicuous madreporite, above junction of bases of two rays. Abactinal plates imbricate, indented proximally for single papula, rarely 2; no carinal series of plates, only one doubly papulate carinal plate; small secondary plates on disc and few abactinally; abactinal plates in about 6 longitudinal series down each side of each ray, plates with elevated rounded proximal edge, about 20 papular plates in uppermost series, 1–3 in lowest series. Surface of abactinal plates covered with up to about 40 short conical to digitiform spinelets, not sacciform, not clustered, spinelets readily lost; spinelets on abactinal apron acicular, conical, subsacciform, about 6 per plate; superomarginal plates with fewer spinelets.

Actinal: inter-radial plates in longitudinal and oblique transverse series from the ambulacrum. Actinal spines per plate: oral 11, long conical, fused basally, shorter distally; suboral about 8, long conical proximally to short distally; furrow 5, conical, fused basally; subambulacral 4, conical, fused basally; actinal 3–5, conical, fused basally; inferomarginal up to about 12, digitiform, short actinally.

Distribution. Palau, off NE Ngeryktabe Island, rocky islets, 10 m.

Etymology. Named for John Starmer who collected and documented the type specimen.

Remarks. Aquilonastra starmeri sp. nov. is distinguished from many *Aquilonstra* species by lacking pedicellariae, lacking carinal series of plates and having a non-fissiparous habit. *Aquilonastra* species that lack pedicellariae but are fissiparous are: *Aquilonastra burtoni* (Gray, 1840); *Aquilonastra cassini* O'Loughlin and Bribiesca-Contreras, 2015; *Aquilonastra chantalae* O'Loughlin and Mackenzie, 2013; *Aquilonastra colemani* O'Loughlin and Rowe, 2006; *Aquilonastra conandae* O'Loughlin and Rowe, 2006; *Aquilonastra doranae* O'Loughlin and Rowe, 2006; *Aquilonastra moosleitneri* O'Loughlin and

Rowe, 2006; *Aquilonastra yairi* O'Loughlin and Rowe, 2006. *Aquilonastra starmeri* sp. nov has 3–5 actinal inter-radial spines per plate and is thus distinguished from those with up to eight and more: *Aquilonastra byrneae* O'Loughlin and Rowe, 2006; *Aquilonastra cepheus* (Müller and Troschel, 1834); *Aquilonastra limboonkengi* (Smith, 1927); *Aquilonastra samyni* O'Loughlin and Rowe, 2006. *Aquilonastra starmeri* sp. nov. has uniformly rounded rays abactinally and is distinguished from those with paxilliform rays: *Aquilonastra lorioli* (Koehler, 1910); *Aquilonastra minor* (Hayashi, 1974); *Aquilonastra rosea* (H.L. Clark, 1938). *Aquilonastra starmeri* sp. nov. is distinguished from the remaining species assigned to *Aquilonastra* that are not fissiparous and lack prominent pedicellariae as follows: *Aquilonastra alisonae* O'Loughlin and Bribiesca-Contreras, 2015 has splay-pointed abactinal spinelets; *Aquilonastra halseyae* O'Loughlin and Rowe, 2006 has sacciform spinelets and the primary superomarginal plates are frequently separated by smaller plates; *Aquilonastra marshae* O'Loughlin and Rowe, 2006 has some doubly papulate carinal series of plates; *Aquilonastra oharai* O'Loughlin and Rowe, 2006 has spinelets in double splayed series across the proximal edge of abactinal plates; *Aquilonastra scobinata* (Livingstone, 1933) has carinal series of singly papulate plates and long thin pencil-like sacciform splay-pointed spinelets. We note again that *Aquilonastra corallicola* was described for Palau and is fissiparous.

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